The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXIV. May 23, 1936 No. 882

Future of the Coal Tar Industry

THERE was a time, not, we believe, within living memory, when coal tar was considered to be a nuisance inherent in the manufacture of coal gas that in its disposal presented difficulties appreciably greater than those to-day caused by the more noxious effluents of the chemical industry. The increase in the practice of tar distillation coupled with the discoveries of the organic chemists of the uses to which the constituents of tar could be put ended this phase, and much of the tar derived from gasworks and coke ovens was distilled. A paper lately presented by Dr. J. G. King, of the Fuel Research Station, to the Institution of Petroleum Technologists must have caused many to wonder whether we are not approaching a new practice of tar disposal. The emphasis now being laid upon home production of oil appears to have prompted Dr. King to investigate the possibilities of using coal tar to assist in this work. At the recent dinner of the Association of Tar Distillers, Captain Crookshank, Minister of Mines, urged the tar distillers to assist in raising the coal trade from its plight by increasing the value of tar.

Many attempts have been made to use tar without prior treatment. Such were cracking to produce gas, the manufacture of roofing felt, use as a paint to preserve stone, woodwork and metalwork. Tar used for most of these purposes now is scientifically prepared from its distillation products, though some of these uses are nearly or quite obsolete. A recent development is road tar. In 1907 tar was applied only to 100 miles of British roads, and that only as a top dressing to settle the dust. To-day, out of some 360 million gallons of tar produced annually in this country, 170 million gallons, or practically half, is sold as road tar. With the continued effort made by the British Road Tar Association and allied bodies it is to be expected that the amount of road tar used in this country will increase.

Apart from these uses of tar for which no preparation is necessary, or the removal of certain fractions only, there has grown up the practice of distilling the tar completely to pitch, the several fractions being collected and treated for extraction of phenols, naphthalene and anthracene, after which they are used for a variety of purposes. Fluctuations of market prices often cause difficulties to the tar distiller, but perhaps the major difficulty of recent years has been the disappearance of the export creosote market after the war. This has turned the thoughts of the tar distiller in other directions, though for a time creosote oil was burned under boilers as a fuel in order to prevent the accumulation of stocks. The recognised tar products are being threatened from another quarter with which the chemical industry is not unfamiliar—synthetic production. In a recent paper by H. H. Lowry, read before the American Institute of Mining and Metallurgical Engineers, it is regarded that the phenol-formaldehyde resins "are in many instances losing ground in competition with some of the newer resins not derived from coal tar." It is also stated that the chemical industry can purchase benzol and by a series of chemical reactions can produce synthetic phenol that can still compete on a price basis with phenol obtained directly from tar.

Perhaps with these facts in mind Dr. King has investigated the possibilities of using tar products, primarily the neutral oils, as a fuel for the internal combustion engine where, if suitable, it would command an attractive price. The prospect is opened of introducing yet another step in tar distillation—the treatment of the creosote oil to produce an oil having those properties that are required in the diesel engine. Unfortunately the survey does not seem very promising. Tar oils are quite suitable for the diesel engine in all but two highly important particulars: their long ignition delay and their too high temperature ignition. It is claimed (not by Dr. King) that a suitable diesel fuel has been made from low-temperature tar, but the high-temperature product appears to present insuperable difficulties.

The way out of the difficulty of disposing of surplus tar oils appears to be hydrogenation. At present the Billingham plant will take any quantity of creosote for this purpose and the Fuel Research Board's experiments show that tar oils boiling above 325° C. may be directly hydrogenated in the vapour phase at temperatures around 500° C. Experiments now in progress appear to give some hope that it will be found possible to hydrogenate tar directly, though the higher-boiling fraction of the pitch appears always likely to cause trouble.

We are driven by these circumstances to ask whether those products, other than hydrocarbon oils, that serve as the raw material for other industries and that are now obtained from coal tar will not be synthetically produced ere long, and whether simultaneously tar distillation will disappear in favour of treatment of the tar by hydrogenation. At the least it may be supposed that all the neutral oils between light oil and pitch will be hydrogenated. The tar distiller may be able to operate hydrogenation plants working on his own oils; he may also produce what are now tar products synthetically; it certainly seems as though the tar distillation trade as it was understood by the last generation may alter considerably before the next generation takes control.

Notes and Comments

Chemical Exports and Imports

A DECREASE of 4 per cent. in the value of exports and an increase of nearly 14 per cent. in imports are the outstanding features of the Board of Trade returns relating to overseas trade in chemicals, drugs, dyes and colours for the first four months of 1936. Studied merely from the point of view of trade balance the figures are somewhat disappointing, but much more satisfaction may be derived from the fact that the total values of chemical products moving in and out of the United Kingdom have risen steadily from £10,352,616 in the first four months of 1934 and £10,738,739 in 1935 to £10,956,503 in 1936. Last year the value of chemical exports was in the proportion of 100 to 51 in relation to imports, but for this year the proportion of imports has risen to 61—an even less favourable position than two years ago when the proportion was 56. Of the £507,060 increase in imports, Germany contributed an increase of £229,008 (including £125,009 more dyestuffs), the United States £128,554 (including £64,083 more carbon blacks) and Canada £11,896. Exports decreased by £289,296, chiefly on account of consignments to India (£103,172 down), Spain (£52,699) and Germany (£42,384). Sulphate of ammonia has again been the principal sufferer, showing a decrease of £149,085 over the four months. On the other hand, dyestuffs increased by £16,777, showing that the British dyestuffs industry is more than holding its own.

Something for Nothing

SOME extremely sensible things were said at the Jubilee Conference of the Incorporated Sales Managers' Association on the pernicious doctrine that it is possible in this world to get something for nothing. Mr. J. Valentine Backes, for example, said that the authorities were concentrating too much on educating the mind for production rather than for selling. How true this is every employer knows who has the misfortune to have to interview boys and girls fresh from State schools in quest of work. The trade unions have for years concentrated the whole of their attention on the making of articles, and they leave the equally important business of selling them to take care of itself. Collectivist propaganda has carried this tendency into a much wider field, and it is a misfortune that the educated classes should largely be brought up to exalt production and mock at the processes of distribution, without realising the absolute interdependence of the two. Mr. Backes said quite truly that education should teach that the "something for nothing" idea was just a myth. The academic mind may not appreciate this, but the practical business man knows that he can get nothing worth having except for a corresponding degree of effort. Mr. Backes also advocated that advertising methods which concentrated on giving the general public this " something for nothing " idea should not only be discouraged but completely eliminated from ordinary trading practice. It could be wished that this sound advice could be given in person to every teacher whose salary comes out of the rates and taxes. Hard experience of a difficult world may eventually bring a change of heart, but at the moment there is clearly something radically wrong with an educational outlook which is quite fairly criticised on these grounds.

Record Output of Dyestuffs

THE British dyestuffs industry continues to grow in spite of increases in imports from Germany and other overseas countries. In 1935 a new record was established with an output of 58,713,384 lb. of synthetic organic dyestuffs, compared with 52,925,636 lb. in the previous year. In the fourteen years for which the Board of Trade has compiled statistics from returns furnished by the principal British dyemakers the annual output has increased by over 147 per cent. The progress has not, however, been uninterrupted; in 1930, for instance, there was a decrease of 13,194,789 lb. from the preceding year's output and there were steady declines in 1925 and 1926. As recently as 1934 there was a fall from the preceding year, and the nearest approach to the new record was in 1929, when the total reached 55,785,032 lb. In 1935 the greatest advance was in vat dyestuffs (including indigo), which were 1,876,823 lb. more than in 1934, closely followed by direct cotton dyestuffs (an increase of 1,384,549 lb.) and acid wool dyestuffs (an increase of 1,098,547 lb.). The rest of the increase of 5,787,748 lb. was fairly evenly distributed over all the other categories, affording welcome proof of all-round prosperity in which no single branch of the industry has advanced to the detriment of another.

The Argentine Agreement

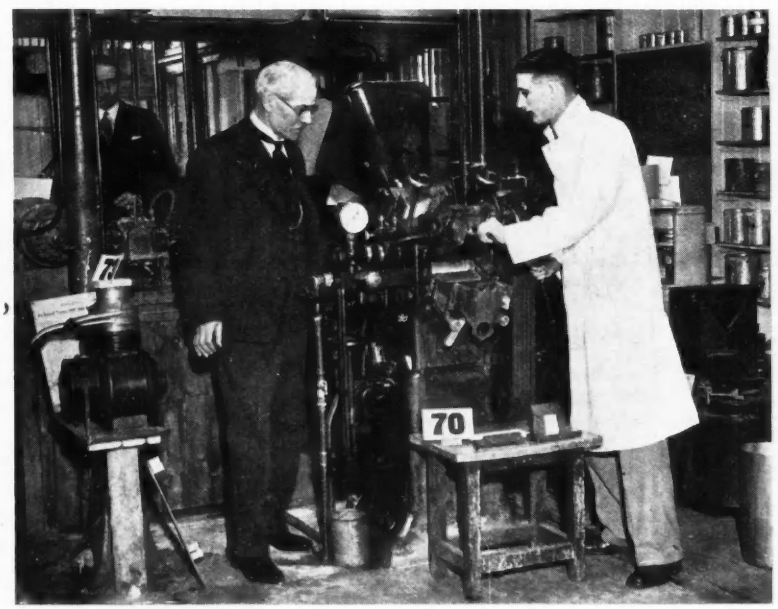
COMPARATIVE figures now available for Anglo-Argentine trade show that British exports to this market have increased by 50 per cent. since the Roca-Runciman agreement was signed. Exports in 1935 totalled £15,607,000 against £10,660,300 in 1932. Critics of the trade agreement point out that even these increased purchases fall far short of our imports from Argentina, which the Board of Trade figures for 1935 gave as approximately £44,000,000. Those who argue that Argentina's imports from this country should balance our purchases of her produce overlook the elementary fact that interest can only be paid in goods, so that from the standpoint of the investor a further increase in Anglo-Argentine trade is highly desirable. The present treaty remains in force till November, but it is to be hoped that its renewal will be announced at an early date. The need for a long-term policy is of the utmost importance to British shipping as the question of new tonnage, whether for development or replacement, can only be settled if the future is secure. Equally, the manufacturer requires stability, as foreign orders are often executed on a credit basis and payments arranged on the assumption that conditions will be stable. The establishment of agencies is also affected, as the expenses of starting foreign branches are heavy and cannot be undertaken if uncertainty prevails. The workings of the Roca-Runciman treaty since 1933 encourage the hope that the British and Argentine Governments, in the two months that remain for discussion, will find a basis to renew this agreement for as long a period as may be possible.

Extensions at the Paint Research Station

Mr. Ramsay MacDonald Performs the Opening Ceremony

IN connection with the opening of the extensions at the Paint Research Station, Waldegrave Road, Teddington, a series of functions were arranged from May 19 to 23. The opening ceremony on Tuesday was performed by Mr. James Ramsay MacDonald, M.P. (Lord President of the Council) and he was accompanied by Sir Frank Smith (secretary, Department of Scientific and Industrial Research). Mr. S. K. Thornley (president of the Paint and Varnish Research Association) presided at the opening ceremony, and there were also present on the platform Mr. Andrew Smith (hon. treasurer of the Research Association of British Paint, Colour and Varnish Manufacturers), Dr. J. J. Fox (Government Chemist), Mr. C. A. Klein (vice-president of the Association), Major J. G. G. Mellor (vice-president of the Association), Dr. L. A. Jordan (director of research, Paint Research Association), and Mr. W. A. S. Calder (president of the Society of Chemical industry).

The CHAIRMAN said it was difficult to imagine any trade in which it would be more interesting to develop technical research or, indeed, one that research was more likely to help than the paint and varnish trade. The paint trade was one of the earliest industries in the world and it was not an exaggeration to say that up to recent years the industry had obtained its results—and very good results—by empirical methods only. It was also a trade which, like many others, was characterised by the fact that the members had very largely tried to keep their processes secret to themselves. There was, perhaps, some wisdom in this method and something to be said for it, because it was interesting to note that out of the firms represented at that gathering no fewer than 36 claimed to have been established for over 50 years, and no less than 22 had been established for 100 years. Moreover, one hoary veteran claimed 176 years, and he believed there was some justification in the claim because his own firm had done business with him for 125 years.



Mr. Ramsay MacDonald opening the extensions at the Paint Research Station, Teddington, on Tuesday. He is seen inspecting a Uniroll machine embodying a new principle in paint making.

From a starting point of great experience and great technical skill the trade had changed over and was to-day actively pursuing collective research, and to a large extent was pooling its knowledge for the benefit of the country generally. When one heard that a certain process had become a lost art, one rather suspected that the application of unscientific methods in improving the process had been the cause of the loss of the art and it could nearly always be shown that the application of scientific methods would restore such lost art. It was nearly always possible to repeat the work and he was certain that the coupling together of the old craftsmanship of the trade with scientific knowledge and research of the future was bound to give something in the future better than had ever been achieved before. The Department of Scientific and Industrial Research had sometimes asked whether in addition to providing an improvement in quality it was not also possible to show savings in cost, but the trade had not aimed at that very much because, after all, the cost of paint was insignificant compared with the total cost of the work and the cost of re-doing the work if the paint failed.

Another essential feature of the work of the Research Association was that it had a definite duty to the public and the increase in the size of the Research Station had made it possible to form a nucleus of a fresh organisation, *i.e.*, a committee and a staff to consider the difficulties of the customer. He bore witness not only to the help which they had received from the Government, but also the help and encouragement which they had had from the Department of Scientific and Industrial Research.

Mr. RAMSAY MACDONALD said the Privy Council was one of those curious parts of the British constitution which was a kind of foster mother to every new idea born in society. When the time came for a united organised education and there was no department to which the care of the new organisation could be entrusted, it was handed over to the temporary and acting mother, the Privy Council. That was so before the Board of Trade came into separate being. At the present time scientific research in connection with the industry had only just begun to be organised and therefore the Privy Council was at present in general charge of it, but he had no doubt that in due time the Department of Scientific and Industrial Research would be a department on its own. The nation was becoming more and more dependent on the paint and varnish trade for its peace of mind, its happiness, and its colour. The average householder knew nothing about paint, he knew nothing about the craftsmanship of the trade and he knew nothing about science, but he appreciated the work that was done by the industry when it was fine work.

Mr. MacDonald congratulated the Paint Research Association on the value of its work. The members of the Advisory Council had been down to see what was being done and the report made would have cheered up their hearts, and especially Mr. Thornley's, who had done so much to bring the research station to its present stage. The Department of Scientific and Industrial Research had granted financial aid to the Association and he did not believe there was a penny of our national income which was spent more profit-

ably than the comparatively small sum that was spent every year under the superintendence of the D.S.I.R. The paint industry had availed itself of the opportunities which had been afforded it and this extension of premises was practical proof.

Major J. G. G. MELLOR (vice-president of the Association) proposed a vote of thanks to Mr. Ramsay MacDonald, who then proceeded to the entrance hall and unveiled the tablet there. This tablet had been designed by Mrs. Edith M. Hinchley, wife of the late Professor John Hinchley, of the Imperial College of Science and Technology. It is executed in bronze by Omar Ramsden, and the rondel has been used by the Association as a book plate and for other purposes.

Lecture by Dr. J. J. Fox

Following the opening ceremony, Dr. J. J. Fox (government chemist) gave a short talk, Mr. Thornley again presiding.

Dr. FOX said one of our difficulties in 1914 was a lack of properly trained technicians. Of engineers there was a sufficiency, but he had in mind the lack of chemists, physicists and micro-biologists, people who could go straightaway into industry and take up some job and carry on in those regions where they were badly wanted when 1915 dawned upon us. There were some firms which had quite a large number of chemists in their employ and curiously enough for some reason or other many of those with whom he had been acquainted during the past 30 or 40 years had been concerned in some way with the paint and varnish industry. He felt the reason why we did not have a sufficient number of trained chemists and technicians in 1914 was due to two causes; one was the idea which so largely prevailed that it was better to let people abroad do the fundamental work and then, if necessary, buy the process from them. That, indeed, had not died out yet. Of course, it could not die out completely. The second cause was that industries which were at all flourishing took all they could out of them and did not put very much back.

Another matter of importance in this same connection was the lack of technical people on the directorates of companies. We found lawyers, accountants and secretarial people and anybody except the "technical man." There had recently been some examples where technical men were placed on the directorates of companies, and he advised that this should be done more often. At least, said Dr. Fox, they could not do worse than some of the present directorates.

Work of National Importance

Commenting on the work of the industrial research associations, Dr. Fox expressed the strong view that this was work of a national character for it meant the pooling of the brains and resources of the industries represented by the various associations in the interest of the nation as a whole; and this he regarded as national work of the highest order. Those who took part in it deserved well of their country. The research associations he felt would have to be regarded as being required to deal with fundamental matters in a way which could not be expected of the private manufacturer. Long-range research of this character had a knack of becoming expensive and that was the sort of thing which individual firms could not be expected to embark upon without very serious consideration unless they could see something coming out of it in a comparatively short time.

Referring to the so-called synthetic resins and varnishes and pigmented materials, Dr. Fox emphasised that these were not merely substitutes for the natural resins, but were entirely new products which called for an entirely new technique in their manufacture. They had their own peculiar effects and properties; they constituted an entirely new field and the efforts that had been made to use them as substitutes were, he felt, wrongly directed. They had a chemistry and a physics of their own. This question of synthetic resins was another field of investigation open to the paint and varnish industry and it was being taken full advantage of by those who led the industry.

Dr. Fox then briefly referred to the mis-use of specifications remarking that having prepared a first class specification for a pigment, the first thing that was done was to take the pigment into the works and make it impure. Yet people were worrying about the fractional percentages of impurities in such materials.

Continuing, reference was made to a number of investigations of a fundamental nature. For instance, it was asked what happened when oil and pigment met in making a paint? When that was really known he was certain the industry would go ahead by leaps and bounds.

Effect of Thinners on Paint Film

Another important fundamental problem was the effect of the thinners on the paint film. Some remarkable observations had already been made at the Research Station, and it was to be hoped the work would be carried farther, on the hydrogenated naphthalenes as compared with white spirit, turpentine, etc. A study had been made of the penetration effects and the effect of viscosity, brushing, etc. It had been found that apart from the question of evaporation, a thinner would keep the film in a particularly soft condition and that might be of importance in connection with the second coat. If it was desired to keep the undercoat in a soft condition, then this particular thinner should be used and the top coat would go on well. What was at the bottom of that ability to change the hardness of the film by changing the thinner? He felt sure there was something fundamental to be found out about thinners in relation to the various types of film that had to be dealt with.

The Paint Research Association had also carried out a substantial amount of work on the protection of iron and it had been demonstrated that the paint maker could make a quite satisfactory protective coat, but it was for the user to apply it correctly, and this was a matter for education. The paint must not be blamed in many cases, but the mode of application. There must be a paint in relation to the surface to be dealt with and the condition of the surface on which the paint was put. Yet another piece of fundamental work was the effect of the reduction of tinting by various white pigments. It was very fortunate that the fundamental figures on the colours could be ascertained in the laboratory so that all the arbirary ways of determining tinting strength or reduction of tint which had been used in the past need not necessarily stand now provided advantage was taken of the facilities available at the Paint Research Station.

Investigation of Polymerisation

Another investigation was the polymerisation which took place in stand oil or the oxidation which took place in linseed oil. Frankly, despite the enormous literature on the subject he himself was by no means clear what was supposed to take place when unsaturated oil was polymerised. He had seen various theories propounded by various people, but never one which satisfied him. A certain amount of linoxyn had been separated and it was possible to separate polymerised oil into its constituents, but what happened to the molecule of the soil? We wanted to know that, and one line of investigation might be with the unsaturated bodies used for making synthetic resinoids. If we knew what was taking place there he felt sure it would be possible to use drying oils to much greater advantage and purpose than was the case now. All this, however, was long-range research, and he did not know whether Dr. Jordan had the time or facilities to carry it out. It was an important research because the industry to a large extent was founded on the drying oils.

In conclusion, Dr. Fox said he could not close without paying a tribute to Dr. Jordan and his staff. Personally he had never failed to get from Dr. Jordan the information he had wanted at any time, and in this same connection he expressed his appreciation of the assistance he had always been given by Mr. Thornley and his fellow associates.

Some Information about Casein

Its Use, Examination and Evaluation

FOLLOWING the annual general meeting of the Oil and Colour Chemists' Association in London on May 14, Mr. C. E. Rowe read a paper on "Casein." He said it was surprising that in view of the number of uses of casein in the industries connected with the Association no paper had been read specifically dealing with this material.

Remarking that casein belongs to the most complex group of proteins, the phospho-proteins, and that it is the principal protein of cow's milk which is its only commercial source, Mr. Rowe said there are two distinct types of casein, *viz.*, acid and rennet or paracasein. The latter term is rarely used in this country but is extensively used in the United States. The use of rennet casein is restricted to the casein-plastics industry. As this country does not produce sufficient milk in excess of its normal requirements to supply even a fraction of the quantity of casein required by various industries there is a large importation, the principal sources of supply being the Argentine, New Zealand and France, whilst smaller quantities are also shipped from Australia, Holland and Denmark.

Methods of Manufacture

Essentially, the manufacture of casein consists of precipitating, washing, pressing and drying the curd of skim milk, and of the many methods available one of the following three are generally employed:—(1) precipitation of the curd by self-souring; (2) precipitation of the curd by means of acid—usually sulphuric or hydrochloric, though acetic and lactic have also been used: (3) curdling by means of rennet. The self-soured type of casein is usually regarded by most trades as the best quality for general use because of its better solubility, greater strength and lower viscosity when dissolved. Most of the acid casein on the English market is manufactured by the self-soured process. An improved continuous process for the manufacture of acid casein has been evolved in America and claims have been made that the product is superior to that made by other methods. This American process, however, is not yet available in this country.

A good quality lactic casein should possess a mild but characteristic odour. It should be nearly white in colour, although this will vary according to the country of origin. Argentine and New Zealand casein possesses a pale cream tint, whilst French casein is much yellower. It should show a low fat content and from 10 to 12 per cent. moisture. The ash content should not exceed 2 per cent. when determined by simple ignition.

Rennet Casein

A good quality rennet casein is practically odourless, tasteless, nearly white or pale yellow in colour, and has very nearly a neutral reaction towards litmus. It should show a fat content not exceeding 1.3 per cent. and from 11 to 13 per cent. moisture. The ash content should approximate to 7.5 per cent. within 0.5 per cent. and the analysis of the ash shows it to be entirely lime and phosphoric acid. A lower ash content indicates an acid condition of the milk; a higher ash content indicating the presence of inorganic impurities. Apart from its higher ash content, rennet casein is readily distinguished from acid casein or the self-soured variety by the fact that it is so readily soluble in alkalies, such as caustic soda. Rennet casein is, in fact, a very difficult soluble material. It is insoluble in carbonate and bicarbonate of soda, only partially soluble in borax or ammonia, and soluble in trisodium phosphate and lime. Its solution in alkalies does not coagulate on heating, but it is precipitated by acids and many metallic salts. The ash content is a good criterion of the quality of the casein and is used in connection with the fat content to determine its suitability for use in casein plastics.

Referring to the manufacture of casein plastics, Mr. Rowe pointed out that their manufacture is based on the apparently simple process of rendering the casein hard and insoluble by the addition of formaldehyde. With the expiration of the basic patents, companies were formed in countries all over the world to manufacture these plastics and at the present time excellent products of this type are manufactured in this country.

Casein Paints and Distempers

Casein paints or distempers were formerly sold in powder form only. Their use, however, has gradually decreased in recent years, due to the introduction of washable water paints prepared in paste form using casein. Casein as an adhesive has one inherent advantage over either glue or starch, *viz.*, the ease with which it is rendered waterproof Further, a casein film by itself is almost colourless. Casein distempers consist of an opaque pigment or mixture of pigments with or without the addition of whiting or china clay, mixed with sufficient casein and the requisite amount of lime to produce a uniform, firmly adherent coating. They contain a minimum of 10 per cent. casein and about 12 per cent. lime. As one of the most important constituents of the casein distemper is commercial hydrated lime, it is essential to determine the actual CaO content, for more errors are made in proportioning the lime to the casein than are made in any other way. The solubility of the casein, when the distemper is ready for application, is dependent on the alkalinity of the lime water, and this in turn is determined by the percentage of active CaO in the lime. It has been proved that for the best casein solubility the correct proportion of lime is 8$\frac{7}{2}$ lb. of CaO to 100 lb. of casein.

Coming to the examination and evaluation of casein, and commenting on the importance of it, Mr. Rowe said he had found in the paint trade that either the casein was purchased and examined in accordance with a strict specification, or a solubility test in alkali solution sufficed. The practical value of casein depended upon its solubility, adhesiveness and general working properties. It should, therefore, be low, in fact, dissolve within certain limits of alkali, possess suitable adhesive strength, viscosity and working properties when dissolved. The following was given as a typical ultimate analysis of commercial casein:—Carbon, 53.3 per cent.; nitrogen, 15.85 per cent.; hydrogen, 7.1 per cent; phosphorus, 0.85 per cent.

The Presence of Phosphorus

The form in which phosphorus is present, however, is still uncertain, although Mr. Rowe said it appears highly probable that part of it is present as phosphate radicle. However, the whole chemistry of casein and its derivatives is very obscure, and, therefore, in the industrial chemist's view, is in an unsatisfactory position. It is unfortunately true that in spite of a considerable effort in the past, strictly chemical tests are impossible of interpretation in the light of present-day knowledge, and decisions are usually made on the basis of physico-chemical tests developed by individual users in various industries. Various empirical tests of a physico-chemical character are also usually employed, such as the "borax-solubility," the "viscosity" and the "strength," but much remains to be done in determining precisely the significance of these tests for the various applications of casein.

While these tests are admittedly quite satisfactory and a means of grading casein for the individual requirements, they are of little value in formulating specifications, as the correct interpretation of the results entail the use of standardised

materials and depend upon the skill and experience of the person who carries out the test. It is found that although a scheme of physico-chemical tests may be sufficient to grade the type of casein required, it is advisable to supplement them by small scale tests of each batch in the formula in which it is to be employed. Another point often overlooked is that batches of reputedly the same casein often differ considerably and it is worth the time and labour to mix bags of casein thoroughly in as large a quantity as possible and to carry out the small scale tests upon the mixed batch.

A general survey was given of the tests usually applied, namely, cleanliness, colour, odour, particle size, moisture, ash, fat and acidity. Other tests mentioned were solubility, viscosity, strength, phosphorus, calcium, and nitrogen.

Points from the Discussion

The PRESIDENT (Dr. G. F. New) commented that casein seemed to have received less systematic attention than many of the other raw materials used in the industry.

Mr. A. L. BACHARACH congratulated Mr. Rowe upon an extremely workmanlike paper. As one connected with the sale of casein for various purposes, Mr. Bacharach had had to learn many things by bitter experience, and in correspondence he had had to correct gross mis-statements, generally made by people who did not possess technical knowledge. Commenting upon the use of empirical tests as a means of estimating the value of casein, he emphasised the desirability of the seller trying to approximate as closely as possible in his tests to the conditions of solution that would be applied in the factory. But there were reasons why it was not always possible to apply the exact technique of the factory. For example, in determining viscosity, the solution used in the factory might be of a strength unsuitable for making accurate estimations of viscosity, and one would have to make laboratory determinations on samples different from those used in the factory and endeavour to relate the laboratory figures to the grading of casein from the point of view of the user. Given goodwill and a certain amount of scientific understanding on both sides it was almost invariably possible to do that. It was also quite possible to prepare a graph by plotting along one axis the different meshes of a series of sieves, and along the other the percentages of the sample which passed through the various meshes, and to ascertain whether the sample contained a high proportion of coarse grains or fine grains.

A Serious Defect

One was not likely to be troubled with high fat content in New Zealand casein, because the regulations there classified products in accordance with the amount of fat they contained, and they would not throw away fat in the casein. A very serious defect in some samples of casein from all parts of the world, however, was the presence of iron. Great difficulties had arisen four or five years ago with foreign purchasers because there was disagreement as to the iron content, and after careful investigation it was found that the gross iron figure for a sample of casein did not necessarily indicate the manner in which the casein would behave in the factory, because the iron was not uniformly distributed and it was not found possible to devise a technique which would give some statistical idea of how the iron was distributed. In many instances a casein containing 30-40 parts of iron per million was found to be better than one containing 5-10 parts per million, because the 5-10 parts per million in the latter sample were concentrated in a few casein particles and led to discolouration of the products that were made.

The adhesives industry added a fluoride to casein to increase the life of the glue. It was curious that if one made up a casein solution in alkali, with borax or carbonate, and added sodium fluoride, there was immediately a smell of ammonia. He did not know the reason, but alkali would do that, whereas a relatively strong acid would not.

In making up distemper pastes the micro-biological problem was of very great importance. One asked for trouble if one added lime, for the micro-organisms battened on to nitrogen, phosphorus and calcium. The micro-biological examination of casein might be a very serious matter. With regard to the proportion of alkali used, he wished other users of casein would take the same sensible scientific view as Mr. Rowe had taken. Over and over again the suppliers were blamed because casein had not behaved properly in the factory. Generally, the trouble was due to the adoption of a routine method, without scientific control, whereby batches were mixed by weight. The moisture content might have varied by 1 or 2 per cent. during storage.

Mr. G. BOLTON SMITH asked whether there was on the market in this country any of the casein obtained from soya beans.

Mr. ROWE replied that he had examined samples of what was stated originally to be the casein material, and which was supposed to have been used at a large motor works in America for making coatings for cars. On making inquiries he was told that his informer did not know exactly what it was used for, but that the company concerned were using a lot of it. It had borne no resemblance to casein, but he was informed eventually that it was soya meal. Examination of a larger sample had confirmed his first opinion that it was of no use at all, as a substitute for casein. He could not see any chance of soya bean meal replacing casein.

Mr. W. GARVIE asked whether pine oil would prevent bacterial and mould growths, and whether casein contained enzymes in the way that starch contained them. He pointed out that some germicides would prevent the bacterial decomposition of the starch, but failed to prevent the enzymic decomposition of starch.

Mr. ROWE said he had found considerable differences in the keeping qualities of oil emulsions according to whether a treated oil or a raw oil was used.

South African Chemical Notes

Perfumery Materials

MR. ALFRED RIDOUT, of J. Grossmith and Son, Ltd., of London, has been on a visit to South Africa and he seems to be favourably disposed towards the establishment of a branch factory in the Union, a step which he fancies might lead to an increase in the sales of his company's products, which have always been well received in South Africa. The most likely site for such a factory would be in Durban, especially as more industrial chemists seem to be available in Natal than in any other part of the country. Mr. Ridout says that such chemists would be necessary for research work in connection with the company's products and they might also study the properties of oil-bearing plants in South Africa which might prove of value to the perfumery industry. Many other recent visitors have seen in South Africa an excellent market for the best types of toilet preparations and perfumery, and interesting developments can confidently be anticipated in the near future.

Mining Explosives

An industrial development regarded as one of the most important of recent years is the decision to double the capacity of the dynamite factory at Modderfontein, near Johannesburg, and when the work is completed this will be the largest dynamite factory in the world. At present the factory at Somerset West has the highest production in South Africa, for it annually manufactures about 1,000,000 cases of dynamite as compared with the 800,000 cases manufactured at Modderfontein, but when the present factory has been doubled the annual production there will be 1,600,000 cases. The expenditure on these extensions is estimated at £1,000,000. It is intended to enlarge the existing ammonia plant for recovering nitrogen from the atmosphere and to open a new department for making ammonium nitrate, an ingredient of explosives previously imported. It is anticipated that the new factory will be ready for operations at the end of the present year, as no time is being lost in pushing on the work.

British Chemical and Dyestuffs Traders' Association

A Successful Year and a Confident Outlook

THE thirteenth annual general meeting of the British Chemical and Dyestuffs Traders' Association was held at the Waldorf Hotel, London, on Wednesday afternoon under the chairmanship of Mr. A. E. Reed. The business meeting was as usual preceded by a trade luncheon, at which the principal guests were Sir Percy Ashley (secretary of the Import Duties Advisory Committee), Dr. J. J. Fox (Government Chemist), Mr. W. J. U. Woolcock, Mr. M. D. Perrins (Home Office), Mr. Fielding (Department of Overseas Trade), Major Knowles (Monsanto Chemicals, Ltd.) and Mr. J. Davidson Pratt, general manager and secretary of the Association of British Chemical Manufacturers.

A Change of Outlook

Mr. J. DAVIDSON PRATT, in proposing the toast of the Association, said there had been a great deal of misconception regarding the relationships between manufacturers and traders. They dated back to the days of Free Trade, when men bought in the cheapest market and sold in the dearest, and the traders carried out those principles religiously. Since then there had been a change of outlook, and it had been felt that if we were to maintain the standard of living and the various other amenities of this country the British productive industry must have some kind of protection against foreign competition, especially when that foreign competition arose from depreciated currencies, lower standards of living and export subsidies. Since those changes had come about it had been noticeable that the antagonism between manufacturers and traders, at any rate in the chemical industry, had disappeared. They had realised the changes in national policy and had played up to them. Speaking as a representative of the manufacturers, he could say that there were many people in that side of the industry who made use of members of the Traders' Association to sell their products. During the past year the relations between the manufacturers' and the traders' associations had been very happy, and there had been a good deal of co-operation in connection with such subjects as the carriage of dangerous goods by road.

Mr. A. F. BUTLER, one of the vice-presidents, responded to the toast, and said that it was a matter for general regret that their president, Mr. Victor Blagden, was again unable to be present, but he had sent them a message of good wishes and had invited them to elect another president—a course which they were not desirous of taking. They could look back with some satisfaction on another year of successful work and they could also look forward to the future with confidence. Not long ago the merchant was looked upon with disfavour, but many people had come to learn that he had his place in the scheme of things, and the Association welcomed the better feeling that now existed. Speaking of the general outlook, he feared they had a dangerous and difficult course to steer during the coming year. He believed it was to this country and perhaps to some extent to the United States that the world would look for light and guidance, and for a way of escape from the stagnation which had fallen upon trade and commerce generally.

Mr. O. F. C. BLOMFIELD proposed the toast of the visitors, which was responded to by Sir Percy Ashley, Dr. J. J. Fox and Mr. W. J. U. Woolcock.

Election of Officers

The following officers were elected at the annual meeting: President, Mr. Victor Blagden; vice-presidents, Mr. A. F. Butler and Mr. S. J. C. Mason; chairman, Mr. A. E. Reed (London); vice-chairman, Mr. J. F. A. Segner; hon. treasurer, Mr. W. Beckley; hon. auditor, Mr. B. C. Hughes; executive council, Mr. O. F. C. Blomfield, Mr. J. Brown (Brown and Forth, Ltd., London), Mr. W. Mann (Produce Merchants, Ltd., London); Mr. C. W. Dean (Ohlenschlager Bros, Ltd., London), and Mr. A. F. Lawson (Jensen, Lawson and Co., London).

The CHAIRMAN, reviewing the work of the association, said it had shown marked development in recent years, and those who closely observed its activities could not fail to recognise the supreme importance of properly organised trade representation. During the year the Association had covered a vast amount of work, particularly in the services rendered to members individually. Assistance in the settlement of disputes with H.M. Customs and in overcoming difficulties in other directions was rendered almost daily. Frequent inquiries were received on such matters as the operation of import duties and restrictions in the United Kingdom and in other countries, on trade agreements, sanctions, exchange regulations and on many other matters of everyday importance to the merchant.

Import Duties on Chemicals

Referring to the alterations in the import duties on chemical materials, Mr. Reed said it was significant that the additional duties imposed on the recommendations of the Import Duties Advisory Committee were all on a specific basis. Early in 1935 the duty on sodium nitrite was raised to £4 per ton, a similar duty being subsequently imposed on a number of products of the synthetic nitrogen industry which was considered of national concern, because of its importance to agriculture and as a potential source of munitions of war. Another item of considerable interest to the trade was the substantial increase in protection given to the producers of linseed oil. On the other hand, import duty was removed on a number of raw materials required in the manufacture of drugs and medicinal preparations. Certain waxes and solid natural resins and a number of essential oils were also placed on the free import list. There were other exemptions, including a number of organic intermediate products used by the dyeing industry. The Association had previously called attention to the unfairness of retaining a duty on many dye stuff intermediates and it was pleasing to observe that further consideration had been given to a question that was of importance to colour users and many members of the Association.

Tariff System Needs Simplifying

It had been said that our tariff system needed simplifying. There was undoubtedly room for some simplification of the many regulations introduced by the departments entrusted with the administration of duties, but he deplored the suggestion that, to avoid delay, applications for additional duty should be granted immediately and before a case for higher duties had been made before the Import Duties Advisory Committee. To apply more stringent protection without proper consideration and regardless of the repercussions was to ignore the advisory function of the committee. He was sure no responsible government would agree to a procedure that obviously would lend itself to much abuse and would deny to a consumer the right to a hearing on a matter in which he might be vitally concerned.

They heard on all sides about the need for reducing high tariff walls and for some modification in the many stringent regulations now in operation. As long as obstacles continued to hamper the proper development of trade between one country and another so international relationships would have the tendency of drifting apart. He would like to see more encouragement for international co-operation in industry as a means for settling economic differences between nations.

Referring to the renewal of the Key Industry Duties, Mr. Reed said he failed to see the justification for the action taken

by the Board of Trade in classifying all grades of decolourising carbons of non-animal origin as " key " articles. Granular carbons only were recommended by the committee of inquiry because of their use in the manufacture of gas masks. Powdered decolourising carbons were not used in any way for defence purposes, and in extending the committee's recommendations much hardship had been imposed on a number of consumers.

Cordial relationships had been maintained with the departments concerned with the administration of trade restrictions and regulations. Negotiations with H.M. Customs were almost continuous, and the authorities were most courteous in their consideration of the matters raised by the Association. It was open to question whether some of the regulations introduced were really necessary for the proper collection of duties.

The Poisons List and Poisons Rules had caused anxiety to various trades. So far as merchants were concerned, sales strictly within the trade were relieved of many of the obligations, but the labelling requirements and provisions in regard to containers in which substances might be supplied or transported were of concern to all dealing in listed poisons. He believed the Home Office intended to issue a memorandum for the guidance of wholesalers and manufacturers, but much of the explanatory work would fall on the trade associations. Members had already had brought to their notice information on the proposed introduction of regulations for the carriage of dangerous goods by road. Various amendments and suggestions had been submitted to the Home Office for consideration. The final draft regulations would be made available for comment, and members would have an opportunity of studying the provisions before they were brought into operation. In conclusion, Mr. Reed thanked the president, the officers and members of the executive council, and the secretary, Mr. F. G. W. Paige, for the help he had received.

Increased Chemical Production

Board of Trade Index Number for March Quarter

INDUSTRIAL activity in the United Kingdom in the first quarter of 1936, as estimated from the particulars furnished from various sources to the Board of Trade, was 1.9 per cent. greater than in the fourth quarter of 1935, and 8.9 per cent. greater than in the first quarter of 1935, the index numbers for the three periods (based on the quarterly average 1930 = 100) being 123.1, 120.8 and 113.0 respectively. Figures for the production of chemicals, oils, etc., are: 1934, 104.6; 1935, 111.8 (109.3, 108.6, 108.8 and 120.3 respectively for the March, June, September and December quarters); March quarter, 1936, 116.2.

The index numbers for the past quarter, both for manufacturing industries and for all groups, represent the greatest volume of production in any quarter for which information is available. The production of iron and steel goods constituted a record, that of textiles was the highest since the first quarter of 1928 and of coal since the March quarter of 1930. Manufacturing production, as indicated by the index, was 1.8 per cent. greater than in the preceding quarter and showed an increase of 9.5 per cent., compared with the March quarter of 1935.

Each of the group indices for the March quarter of 1936 shows an appreciable improvement compared with the corresponding quarter of 1935, with the exception of that for non-ferrous metals, this group recording a decline of about 5 per cent. in the later period. The principal increases were for iron and steel (20 per cent.), building materials and building (10½ per cent.), engineering and shipbuilding (9½ per cent.), and the food, drink and tobacco group (8½ per cent.). The textiles and chemicals, oils, etc., groups each recorded an increase of about 6½ per cent., and the output of coal was greater by about 5 per cent.

Continental Chemical Notes

Russia

TWO NEW ASPHALT FACTORIES with an annual capacity of 90,000 tons each are being built near Moscow.

Jugoslavia

THE PYRETHRUM HARVEST FOR THE PAST YEAR is estimated at about 700 tons with an average pyrethrin content of 0.85 per cent.

Roumania

AN ARRANGEMENT HAS BEEN CONCLUDED between the First Roumanian Explosives Works and the Hermes Vegetable Oil Refinery whereby the latter concern undertakes to deliver its total annual production of nitroglycerine (or a minimum of 100,000 kg.) to the former concern. The Hermes Refinery recently extended its nitroglycerine plant.

Germany

THE DEUTSCHE SOLVAY-WERKE A.-G., of Bernburg, announces a net profit of 3.1 million marks for the past year and distributes 4 per cent. dividend upon the 75 million mark share capital.

SCHIMMEL AND CO., A.-G., the Leipzig essential oil manufacturers, have again declared an 8 per cent. dividend for the 1935 trading year, the net profit increasing from 228,000 marks in 1934 to 289,000 marks.

THE WESTFALISCH-ANHALTISCHE SPRENGSTOFF A.-G., of Berlin, reports a reduced net profit in 1935 of 813,000 marks (one million in previous year). The damage caused by the serious explosion at the Reinsdorf works was only partially covered by insurance, but the emergency was met by withdrawals from the substantial reserve fund.

Iceland

ACCORDING TO A COPENHAGEN REPORT the first glass factory in Iceland is being built in Rejkiavik for the production of ordinary bottles. It is hoped to utilise domestic raw materials in due course.

Far Eastern Chemical Notes

China

LITHOPONE MANUFACTURE HAS BEEN STARTED in Shanghai by the Tung La Oriental Pigment Dye Industrial Works, Ltd., which are securing raw materials from deposits in the neighbourhood.

Japan

FORMALDEHYDE IS NOW BEING MADE on an increased scale by Nippon Sakusan Seizo K.K., its present monthly output of 250 tons comparing with the maximum plant capacity of 300 tons. The concern is also embarking on the manufacture of acid dyestuffs.

THE printing ink industry of Argentina has made considerable strides within the past few years, with the result that creditable work is being done in almost all printing and colour work lines. The total number of printing ink plants in Argentina, according to recent estimates, was 1,700, including 40 lithographic plants. No figures are obtainable covering the production of printing inks in the country, but it is estimated that 90 per cent. of the news ink and over half of the coloured inks are supplied by domestic manufacture.

Third World Power Conference

Preparations for the Washington Meeting

DETAILS of the 23 papers which are being presented by the British National Committee at the third World Power Conference to be held in Washington between September 7 and 12 were issued on Wednesday together with particulars of the six papers and one communication which are being presented by the British Committee of the Commission at the second congress, International Commission on Large Dams of the World Power Conference, which is being held in Washington concurrently with the World Power Conference.

There will be a large and influential British delegation including several official Government representatives. The total British participation is likely to exceed 100, the majority of whom will travel in "The Queen Mary" sailing from Southampton on September 2. Particulars regarding the "Study Tours" which are being organised by the American National Committee both before and after the conference and congress, for the benefit of the members, and also regarding the post-conference transcontinental tour, have just been received in London. Intending participants are urged to communicate without delay with the British National Committee, 36 Kingsway, London, W.C.2.

Titles and Authors of British Papers

Following are the titles and authors of the British papers, the name of the authoritative body being given in parentheses:

"Power Resources, Development and Utilisation" (British National Committee), Frederick Brown, Editor of the Statistical Year Book of the World Power Conference; "Significant Trends in the Development and Utilisation of Power Resources" (British National Committee), Frederick Brown; "Collection, Compilation and Publication of Statistics with Particular Reference to International Use; Coal and Coal Products and Petroleum" (Mines Department); "Collection, Compilation and Publication of Statistics with Particular Rerefence to International Use: Electricity" (Central Electricity Board), Hugh Quigley and A. S. Windett; "Organisation of the Production and Distribution of Coal" (Mines Department and Mining Association); "The Processing of Coal" (Mines Department); (Fuel Research Station) Dr. J. G. King; (British Iron and Steel Industrial Research Council) E. C. Evans; (Coke Oven Managers' Association) T Westthorp; "The Organisation of the Production, Refining and Distribution of Petroleum and Petroleum Products" (Part I, Petroleum Department, Part II, British National Committee); "Organisation of the Production, Transportation and Distribution of Manufactured Gas and Gas By-Products" (British National Committee), R. W. Hunter and Dr. G. W. Anderson, Gas Light and Coke Co.; "Organisation of Private Electric Utilities in Great Britain" (Incorporated Association of Electric Power Companies), W. B. Woodhouse, Yorkshire Electric Power Co.; "The Organisation of Private Gas Utilities" (National Gas Council), Leslie F. Stemp; "Public Regulation of Private Electric Utilities" (Incorporated Association of Electric Power Companies), John C. Dalton, County of London Electric Supply Co.; "Public Regulation of Private Gas Utilities" (National Gas Council), Leslie F. Stemp; "Organisation, Financing and Operation of Publicly-Owned Electric Utilities" (Incorporated Municipal Electrical Association), H. C. Lamb, Manchester Electricity Department; "Organisation, Financing and Operation of Publicly-Owned Gas Utilities" (National Gas Council); "The Conservation of Coal Resources—The British Fuel Research Coal Survey" (Fuel Research Station), Dr. F. S. Sinnatt; "Conservation of Petroleum" (British National Committee); "The Scope, Duties and Possibilities of a National Water Board" (British National Committee), Sir Alexander Gibb; "Integration of Electric Utilities in Great Britain" (Central Electricity Board), Harold Hobson; "Regional Integration of Gas Utility Facilities in Great Britain" (British National Committee), Dr. C. H. Lander; "Rationalisation of the Distribution of Electric Energy" (British National Committee), James R. Beard; "Rationalisation of Distribution of Gas in Great Britain" (British National Committee), George Evetts; "Rural Electrification in Great Britain" (British National Committee), S. E. Britton, Chester Electricity Department.

Papers to be presented by the British Committee at the International Congress on Large Dams are as follows:

"Special Cement" (Joint Sub-Committee on Special Cements of the Institution of Civil Engineers and the British Committee on Large Dams), W. T. Halcrow and Dr. F. M. Lea; "Temperature Effects in Mass Concrete," Dr. N. Davey; "Contraction Joints," E. Sandeman; "Design and Water-Proofing of Shrinkage, Contraction and Expansion Joints in Concrete Dams," James Williamson; "Study of the Facing of Masonry and Concrete Dams as Illustrated by the Design of the Shing Mun Dam," W. J. E. Binnie; "The Geology of Reservoir Dam Sites—Great Britain," Dr. Bernard Smith and C. E. N. Bromehead; communication on "Dams Built of Precast Concrete Blocks," W. T. Halcrow.

Welded Mild Steel Drums

New British Standard Specification

THE British Standards Institution has recently issued a British Standard Specification for welded mild steel drums. In the course of its preparation a difficult problem had to be faced of deciding the particular liquids which should be considered, and it was finally decided that for this particular specification all liquids which developed vapour pressures of more than 20 lb. per square inch absolute at temperatures below 45° C. or which had a flash point below 73° F. should be excluded.

The specification provides for three classes of drums which are based upon a classification of liquids according to their corrosive properties and specific gravities, but gives no indication as to the particular liquids themselves. This course has been adopted since it would be difficult to make a comprehensive list of existing liquids which might be transported in these drums, and it would further be impossible to include in such a list liquids which, although not now packed in steel drums, might be so packed in future.

The specification standarises the dimensions of drums in various capacities, from five to 150 gal., and includes details in respect of the method of construction and the dimensions of the bung and boss. In arriving at the requirements in constructional strength the conditions of transport normally associated with returnable packages were taken into consideration. In view of the many alternative methods of construction for drums having a thickness of less than 18 B.G. such drums are not provided for in the specification.

Copies of this new specification, B.S.S. No. 670-1936, may be obtained from the British Standards Institution, 28 Victoria Street, S.W.1, price 2s. 2d. post free.

THE change from vegetable to coal-tar dyes has created an excellent market in Mexico for synthetic dyes. Importations increased from 138,240 pesos in 1930 to 980,687 in 1934, and the importation in 1935 was probably slightly less than during the preceding year. Germany continues to dominate the market and shipped 696,497 pesos during the first ten months of 1935, while the United States supplied 1,110 pesos. Switzerland is second with 130,349 pesos and Netherlands third with 13,099 pesos.

British Overseas Chemical Trade in April

ACCORDING to the Board of Trade returns for the month ending April 30, 1936, exports of chemicals, drugs, dyes and colours were valued at £1,639,143, as compared with £1,729,143 for April 1935, a decrease of £90,000. Imports were valued at £1,082,937, as compared with £935,103. Re-exports were valued at £38,630.

Imports

	Quantities. April 30, 1935.	Quantities. April 30, 1936.	Value. April 30, 1935. £	Value. April 30, 1936. £
Acids—				
Acetic .. .. cwt.	15,407	14,490	23,557	18,964
Boric (boracic) .. ,,	1,210	2,800	1,204	2,799
Citric .. .. ,,	1,000	1,283	3,983	5,100
Tartaric .. ,,	3,364	3,298	14,299	13,482
All other sorts .. value	—	—	9,201	7,610
Borax .. .. cwt.	13,703	16,116	6,874	9,507
Calcium carbide .. ,,	89,668	111,155	50,357	65,165
Fertilisers, manufactured—				
Superphosphate of lime tons	5,151	8,998	10,159	16,997
All other descriptions ,,	4,031	2,129	22,384	12,137
Phosphorus .. cwt.	—	—	—	—
Potassium compounds—				
Caustic and lyes cwt.	13,205	12,378	15,802	13,760
Chloride (muriate) ,,	76,559	48,887	22,520	16,075
Kainite and other mineral fertiliser salts cwt.	187,360	159,687	25,785	23,018
Nitrate (saltpetre) ,,	8,052	16,417	4,491	9,911
Sulphate .. ,,	38,799	24,074	13,542	10,537
All other compounds ,,	10,133	9,554	17,739	15,493
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	54	42	104	42
Chromate and bichromate .. .. cwt.	5,534	2,408	7,434	3,169
Cyanide .. ,,	1,274	3,001	3,000	7,504
Nitrate .. .. ,,	49,933	40,000	11,234	8,561
All other compounds ,,	21,552	18,436	14,531	12,500
Other chemical manufactures .. .. value	—	—	246,671	270,711
Drugs and medicinal preparations, manufactured or prepared—				
Quinine and quinine salts .. .. oz.	117,278	26,166	9,650	2,374
Medicinal oils .. cwt.	3,202	2,482	8,995	5,282
Proprietary medicines value	—	—	35,955	52,976
All other sorts .. ,,	—	—	36,338	38,080
Dyes and dyestuffs and extracts for tanning—				
Finished dye-stuffs (coal tar) .. .. cwt.	3,458	6,873	96,848	184,215
Extracts for dyeing ,,	8,863	16,287	16,898	21,432
Extracts for tanning—				
Chestnut .. cwt.	33,318	31,460	24,606	21,310
Quebracho .. ,,	43,422	11,856	26,955	10,188
All other sorts ,,	28,059	40,579	20,799	30,285
All other dyes and dyestuffs cwt.	799	1,227	23,986	25,221
Painters' colours and materials—				
White lead (basic carbonate) .. cwt.	7,357	6,698	8,548	8,550
Lithopone .. ,,	13,717	24,872	9,230	15,563
Ochres and earth colours cwt.	49,458	21,661	19,135	7,937
Bronze powders ,,	1,326	1,649	9,367	11,555
Carbon blacks .. ,,	18,552	43,410	29,496	63,228
Other pigments and extenders .. cwt.	25,562	24,471	6,596	8,330
All other descriptions ,,	14,236	12,498	26,830	33,378
Total .. .. value	—	—	935,103	1,082,937

Exports

	Quantities. April 30, 1935.	Quantities. April 30, 1936.	Value. April 30, 1935. £	Value. April 30, 1936. £
Acids—				
Citric .. .. cwt.	1,678	2,699	7,070	11,817
All other sorts .. value	—	—	23,646	19,589
Aluminium compounds tons	952	5,011	5,632	50,069
Ammonium compounds—				
Sulphate .. tons	15,250	17,208	91,518	100,747
All other sorts .. ,,	1,094	1,451	13,128	15,138
Bleaching powder (chloride of lime) .. cwt.	44,947	40,710	12,205	11,521
Coal tar products—				
Cresylic acid .. gal.	144,939	212,830	14,386	22,127
Tar oil, creosote oil, etc. gal.	4,891,008	1,724,387	110,680	42,122
All other sorts .. value	—	—	13,790	18,734
Copper, sulphate of tons	4,271	1,625	57,584	23,143
Disinfectants, insecticides, etc. .. .. cwt.	28,022	31,452	62,190	62,042
Fertilisers, manufactured tons	16,270	12,513	69,164	51,759
Glycerine .. .. cwt.	13,268	9,794	31,785	25,178
Lead compounds .. ,,	15,135	10,889	16,761	14,400
Magnesium compounds tons	493	487	11,213	11,015
Potassium compounds cwt.	6,120	5,215	11,155	9,178
Salt (sodium chloride) tons	22,336	17,370	59,378	44,230
Sodium compounds—				
Carbonate, including crystals, ash and bicarbonate .. cwt.	345,972	343,972	82,137	75,988
Caustic .. .. ,,	200,834	165,329	105,900	80,678
Nitrate .. .. ,,	18,146	17,690	6,067	5,707
Sulphate, including salt-cake .. cwt.	28,073	5,046	2,761	785
All other sorts .. ,,	71,439	59,892	73,195	74,341
Zinc oxide .. .. tons	1,218	1,051	21,358	19,779
All other descriptions value	—	—	204,655	212,576
Drugs and medicinal preparations—				
Quinine and quinine salts .. .. oz.	101,952	107,639	11,209	11,250
Proprietary medicines value	—	—	81,674	89,192
All other descriptions ,,	—	—	117,688	127,098
Dyes and dyestuffs and extracts for tanning—				
Finished dyestuffs (coal tar)—				
Alizarine, alizarine red and indigo (synthetic) cwt.	2,335	1,742	13,530	11,233
Other sorts .. ,,	6,612	6,661	86,004	91,227
All other descriptions ,,	18,314	21,289	27,564	23,823
Painters' colours and materials—				
Ochres and earth colours cwt.	21,251	16,267	17,944	14,044
Other pigments and extenders .. cwt.	18,062	21,578	36,336	35,752
White lead .. ,,	5,929	6,369	9,293	13,160
Paints and painters' enamels, ready mixed cwt.	35,972	37,227	92,784	98,979
Varnish and lacquer gal.	85,527	74,569	32,757	29,151
Printers' ink .. cwt.	4,624	4,280	27,440	22,026
All other descriptions ,,	33,089	36,546	67,556	69,545
Total .. .. value	—	—	1,729,143	1,639,143

Re-Exports

	Quantities. April 30, 1935.	Quantities. April 30, 1936.	Value. April 30, 1935. £	Value. April 30, 1936. £
Chemical manufactures and products .. value	—	—	19,196	27,602
Drugs and medicinal preparations—				
Manufactured or prepared .. .. value	—	—	6,969	8,086
Dyes and dyestuffs and extracts for tanning cwt.	530	2,020	896	2,265
Painters' colours and materials .. .. cwt.	614	360	1,320	677
Total .. .. value	—	—	8,381	38,630

Corrosion-Resisting Centrifugal Pumps

By H. SEYMOUR

CENTRIFUGAL pumps are being used to an increasing extent for handling fluids which are corrosive, either in the sense that the pumps themselves become damaged or that the fluid they handle is exposed to contamination. For this reason it has been necessary to find acid-resisting materials which would not be corroded by the liquids which are to be pumped. This is particularly important where the finished products have to be particularly pure, without any trace of metal in them.

In many works pumps are kept going day and night, and consequently, besides being resistant to chemical action, they must also be of robust construction in order that they may be capable of enduring this continuous service. When designing such pumps special attention has to be given to the impeller and stuffing-box, since the liquids to be handled sometimes contain particles of foreign matter. With a badly designed stuffing-box there is a danger of scale forming in it, which would have an abrasive effect on the shaft and packing, provoking great wear in a very short time and rendering the stuffing-box very leaky; it might also happen that the impeller would become choked and the pump would finally stop delivering.

Two Excellent Materials

Two excellent acid-resisting ferrous materials have been found in the stainless steels and the silicon-iron alloys. Most stainless steels contain 17 to 21 per cent. chromium and 6 to 11 per cent. nickel. The structure is an austenitic mixed crystal, in which the carbon, chromium and nickel are completely dissolved. The excellent acid-resisting properties of these materials are explained by their not showing any tendency to form combinations with other elements, *i.e.*, the free valencies on their outer surfaces are soon saturated with oxygen. This forms a protective layer of oxide, and the metal consequently behaves electro-chemically, in so far as it is liable to chemical action, like a precious metal. By the method of electronic diffraction it has been determined that the thickness of the protecting coating of such passive iron must be about 2 atoms. The same is the case for stainless steels; their property of being stainless depends to a large extent on this protecting layer remaining undamaged. Preservation of this layer is assisted by the great tendency of the material to remain passive. In the presence of oxygen the layer always endeavours to form again; an addition of molybdenum appears to strengthen this tendency. On the other hand, stainless steels should as far as possible be kept out of contact with other metals in order to prevent any electrolytic action.

Addition of Molybdenum

A typical steel of this nature would have a melting point 1,400° C., specific gravity 7.86 to 7.9, specific heat 0.12. Some of these steels are absolutely non-corrodible by nitric acid or by organic acids, bases, lyes, salt solutions, etc. When molybdenum is added to it, its resistance to corrosion is increased and the steel is particularly suitable for hot sulphurous acids, hot acetic acid, dilute formic acid, and other organic acids, particularly when they are under pressure. Another steel with an addition of copper is also used for some special purposes.

In some designs of acid-resisting centrifugal pumps made of stainless steel, the liquid enters the pump axially. The impeller is overhung on the shaft, which is borne on a pedestal on the driving side. This arrangement of the impeller makes it unnecessary to have any inner bearing lubricated by liquid in the suction branch; in addition, only one stuffing-box is necessary and the impeller allows a larger quantity of liquid to pass than when the liquid enters on both sides. When dealing with liquid containing much fibrous matter, even an impeller of the usual type with the liquid entering on one side is very liable to become choked. In such cases one maker has adopted the so-called open impeller.

The stuffing-box in the acid-resisting pumps mentioned is not under pressure from the liquid and this must be regarded as a great advantage, for the stuffing-box packing will no longer be fluid tight if the gland has to be drawn up hard, in order to prevent the liquid issuing from it. The stuffing-box is relieved by means of an auxiliary pump which removes any liquid passing to the stuffing-box and discharges it into the suction chamber of the impeller. The packing has only to keep the pump from leaking when it is at rest; when the pump is running the auxiliary pump keeps liquid circulating, and thus prevents air being drawn in. The auxiliary equipment is designed in such a way that the packing could be dispensed with altogether if the liquid reached the pump at a pressure of 6½ to 10 inches water gauge. In practice such pumps are known as "acid-resisting pumps without stuffing-boxes."

Stuffing Box Packing

Experience has shown, however, that in the majority of cases it is preferable to provide a relieved stuffing-box packing as well as the hydraulic packing. Its principal purpose is to prevent the liquid issuing from the pump when it is at rest; the stuffing-box should only be slightly tightened up. If a pump must work with suction, the sealing liquid is taken to the sealing liquid space of the stuffing-box from the delivery branch through a special passage. The auxiliary pump also takes up this liquid and sends it back to the suction side of the pump, thus relieving the packing.

The shaft is carried either in two ring-lubricated bearings or in radial ball bearings. The impeller has packing surfaces on both sides; they are of the same diameter, so that the impeller is therefore balanced hydraulically. Although no axial thrust worth mentioning can occur, a robust double-thrust ball bearing is arranged at the end of the shaft in order to take up any axial thrust which may arise. This thrust bearing is of particular importance when the packing rings become irregularly worn. Such pumps may be driven either direct coupled by electric motors or by belt. In the latter case it is preferable to fix a flexible coupling between the pump and pulley shaft. The pump can then be changed for another and inspected without the drive having to be removed. The pulley shaft is carried in two robust ring-lubricated bearing pedestals. Because of the severe conditions under which the pumps have to run, particularly since they are generally under the supervision of unskilled workers, the robust construction of the drive and of the pump itself, and the ease with which one pump can be exchanged for another, are important.

Silicon Iron Pumps

As regards design, silicon iron pumps do not differ greatly from stainless steel pumps. Naturally, the mechanical properties of the material must be taken into consideration when designing individual parts. In order to comply with foundry requirements, the shape given to various parts has been kept as simple as possible. In addition to that, the number of surfaces requiring machining is everywhere kept as low as possible. Also in these pumps the liquid axially and the impeller is hydraulically balanced. There is also an auxiliary pump for relieving the stuffing-box. The steel shaft is protected by a silicon iron bushing which reaches beyond the stuffing-box.

Special consideration must also be paid to any alteration in the resistance curves of the piping. Experience shows that the piping often becomes heavily encrusted in the course of

time; the quantity delivered by the pump then decreases, if no proper allowance has been made to prevent it. This can be recognised most easily from a glance at the characteristic for the head. The total head is composed of the actual measured head, the resistance in the piping and the pressures or vacuums which may prevail. When extending existing plant, calculations are generally based on the measured pressure in lb. per sq. in., *i.e.*, on the figure given by the vacuum and pressure gauges, which takes account of the specific gravity. The total head is determined by the formula

$$H = \frac{p.23}{y}$$

where H is the head in feet, p the pressure in lb. per sq. in., and y the weight of the liquid in lb. per gallon.

Water Supplies and Sanitation

The Problem of Trade Effluents

THE annual report of the Water Pollution Research Board for the year ended June 30, 1935 (H.M. Stationery Office, 1s. net), points out the importance of accurate information on the water resources of the country and their variation with different conditions of weather. Information of this kind is required not only in considering schemes for water supplies, land drainage, fisheries, hydro-electric and other electricity stations and for industrial processes, but also in attempts to control and prevent water pollution. In this connection the report mentions that the Board is in close touch with the work of the Committee on Inland Water Survey recently appointed by the Minister of Health and the Secretary for Scotland. The investigations being carried out under the supervision of the Board may be divided into four main groups dealing respectively with water for public supply, sewage, trade waste waters and various problems of river pollution.

Water Softening

The report summarises the principal results obtained during the last few years in an investigation of the base-exchange process of water softening. This process is employed by several water supply undertakings and by many industrial firms; it is the basis of the household softeners in common use in various parts of the country. Base-exchange materials in use for softening water include synthetic products and treated minerals. Some of the synthetic products are manufactured in this country, but the minerals are imported mainly from abroad. As a result of the investigation methods of treatment have now been devised whereby materials suitable for softening water can be prepared from certain British clays. From a few of the clays materials have been obtained which are equal in softening value to imported clays and are less liable to deterioration. Experiments have shown that base-exchange materials can remove all traces of metals such as lead, copper, zinc and tin from water. The subject is of importance since considerable quantities of these metals may be present in drinking water under certain conditions. An application of these results has been the development of a method for determining the true average concentration of lead in drinking water drawn from a household service over a period of weeks.

Trade Effluents

One outstanding discovery resulting from the Board's work is that certain synthetic resins possess marked base-exchange properties, greater in some instances than the base-exchange values of existing commercial materials. Other resins have been prepared which remove acids from solution in water. By treatment of tap water with a resin of one type and then with a resin of the second type, the salts in solution were reduced from 33 parts to about 1 part per 100,000.

Further instances of serious pollution of rivers and streams and of difficulties at sewage disposal works have resulted from the discharge of effluents from dairies and milk products factories. Pollution of this kind has increased to such an extent during the past few years that the development of means of dealing with the problem has become a matter of some urgency. Experiments carried out in the laboratories of the Rothamsted Experimental Station and of the Birmingham, Tame and Rea District Drainage Board have indicated that the waste waters from washing churns, other equipment and factory premises can be satisfactorily purified by biological oxidation in percolating filters and by the so-called activated sludge process. These processes, which are similar to those in operation at many sewage disposal works, are now being examined on a large scale in two experimental plants erected for the purpose at a creamery at Ellesmere, Shropshire. Through the Milk Marketing Board, the industry is co-operating in this investigation and is contributing £3,000 a year for two years towards the cost.

Methods of Sewage Purification

Further progress has been made in fundamental investigations of the biology and chemistry of methods of purification of sewage. Results of considerable value have been obtained, particularly in connection with the activated sludge process. The object of an investigation in progress on the River Mersey is to determine the effect of discharges of crude sewage on the amount and nature of the material deposited in the estuary. This deposition has for many years necessitated extensive dredging. The subject is of great importance to the Merseyside local authorities, the Mersey Docks and Harbour Board and other interested undertakings, who are bearing the cost of the investigation. During the past year, movements of the main navigable channels have been studied and estimates have been made of the quantities of water carried by the rivers and streams entering the estuary and of the volumes of sewage discharged. Possible sources of the mud and clay deposited in the estuary have been surveyed. Such sources include material eroded from the shores and banks, solid matter washed down by the rivers and streams and solid matter carried up into the estuary by sea water from Liverpool Bay and the Irish Sea. For purposes of comparison many samples of material from various parts of the bed of the Irish Sea, as far as the Isle of Man and Morecambe Bay, and from other estuaries have also been examined. Numerous experiments have been carried out on the conditions affecting the rate of deposition of mud and clay from suspensions in sea water, estuary water and fresh water; they have included many experiments on the effects of adding sewage to the suspensions.

THE Government of Mysore has decided to start a factory for the manufacture of cement at Bhadravati. The total capital cost of the factory is estimated at £45,000. The capacity of the factory would be just sufficient to meet the demand for cement in the State. It would manufacture about 18,000 to 20,000 tons per year. The new cement factory would be run as part of the Mysore Iron and Steel Works. Mysore consumes about 12,000 to 15,000 tons of cement annually.

A New Design of Calandria Vacuum Pan

Economy in the Use of Steam in the Works

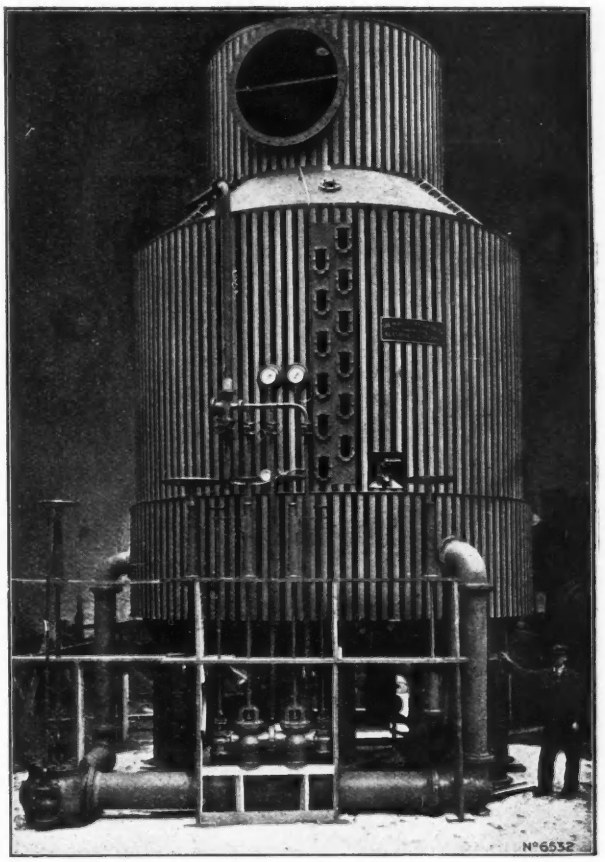


Fig. 1.—A Calandria Pan 15ft. in diameter recently shipped to the West Indies.

OF recent years the necessity of using low pressure exhaust steam and sometimes vapours for all heating and boiling apparatus in many sugar and similar factories, has led to the extensive use of the calandria vacuum pan in preference to the coil pan, so that many factories to-day are equipped only with calandria pans.

The requirements with regard to high quality of product, speed of boiling and economy in the use of steam, have led to great improvements in the design of these pans, and a British vacuum pan is now built by the Mirrlees Watson Co., Ltd., to meet modern conditions. Fig. 1 shows a 15 ft. diam. calandria pan which has recently been shipped to the West Indies, and gives a general idea of the layout. The arrangement introduced by Mirrlees, and now being extensively adopted, of grouping all the instruments and control valves within the easy reach of the operator in front of the pan, is a feature of this design.

Owing to the special design of bottom, hereafter described, the graining volume of the massecuite in the pan is 28 per cent. of the total strike capacity. This is of great importance when shock seeding in the pans, that is, introducing a fine powdered sugar dust at a certain point in the boiling to accelerate the formation of crystals in the massecuite.

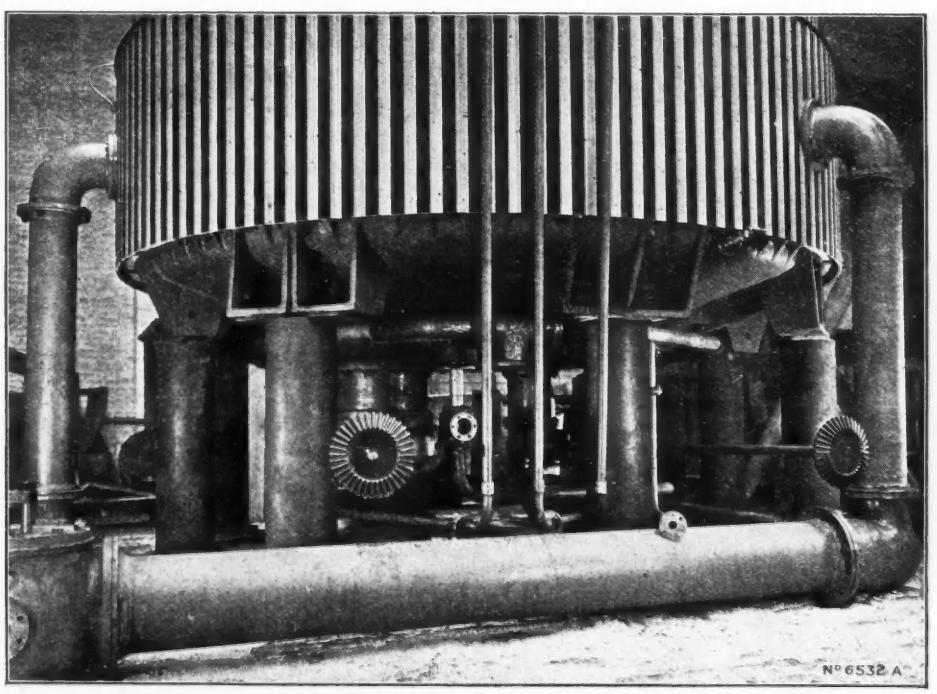


Fig. 2.—Drain outlets, which are fitted with sight glasses to see that the drains are functioning properly, thus reducing the possibility of waterlogging of the calandria.

An extra large centre well is provided in the calandria, being half the diameter of the pan at the top, and tapered to a slightly smaller diameter at the bottom. Steam is introduced into the calandria at two or three places (depending on the size of the pan), evenly spaced around the circumference and into an annular space around the shell, deflectors being placed opposite each entry port to ensure even distribution. The withdrawal of incondensable gases is facilitated by carefully devised baffles placed in the steam spaces so that no dead spots are left where these gases may accumulate.

A fitment is provided for a sensitive thermometer on the incondensable gas outlet, so

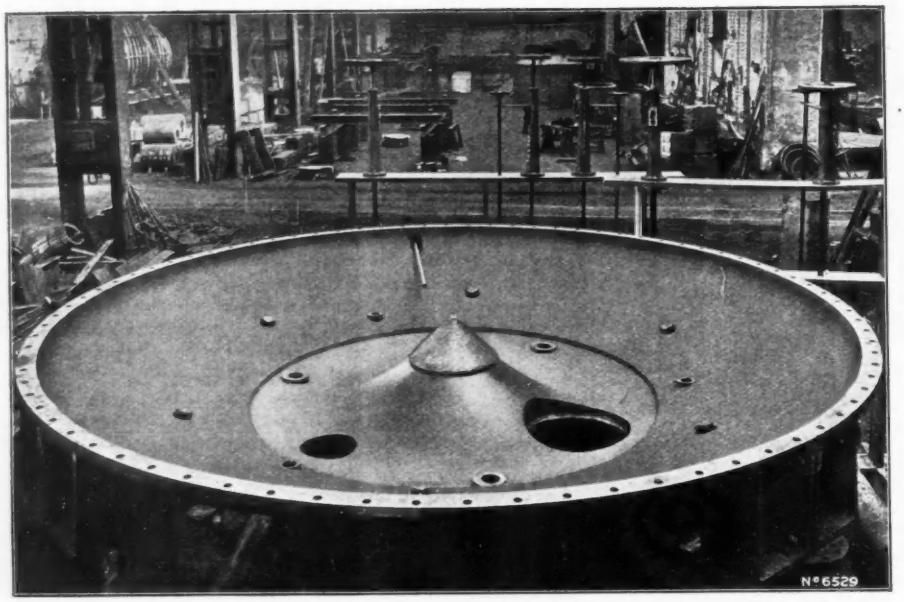


Fig. 3.—The inclined bottom of the calandria, designed to give a stream flow effect.

that a visible indication of whether or not the venting is being properly accomplished is available, and the outlets can be regulated accordingly. If the temperatures of the gases being vented and the steam in the calandria are within 4° F. one of the other, then venting is good.

The circulating well protrudes below the lower tubeplate and forms one side of a channel for collecting the condensate. A number of holes are drilled in the bottom tubeplate to allow a free passage of the condensate to the channel, and this water is drawn off at various points. A feature is the sight glass on the drain outlets, so that it can be seen at a glance if the drains are functioning properly, thus reducing the possibility of waterlogging of the calandria. These outlets are illustrated in Fig. 2.

The bottom, shown in Fig. 3, is inclined to 20° to the horizontal, and it has been found that even very heavy and viscous massecuites discharge quite freely from this type of bottom. This bottom is designed to give a " stream flow " effect, that is, the massecuite descending through the circulating tube is directed in such a manner that the reversing of flow to ascend through the heating tubes is accomplished without the formation of swirls and eddies. the feed liquor is introduced at various points round the bottom of the pan, and at the entry ports arrangements are made to cause the incoming liquor to circulate with the flowing massecuite. This prevents interference with the massecuite circulating in the pan, and keeps down the possibility of excessive local disturbances due to any difference in temperature or density of the incoming liquor.

The pan is designed so that mechanical circulation can be applied if required for certain classes of liquor. The first pan of this type was shipped in September, 1935, and since then the Mirrlees Watson Co., Ltd., has had in hand nine pans of this design for Argentina, Portuguese West Africa, Fiji, India and England.

Oil and Colour Chemists' Association

Annual General Meeting

THE annual general meeting of the Oil and Colour Chemists' Association was held in the lecture hall of the Institute of Chemistry, London, on May 14, the retiring president (Mr. G. A. Campbell) in the chair. The annual report showed an increase of membership from 547 to 591 during the year.

Referring to the Council's policy of securing united effort with other organisations within the industry, the report stated that a generous gesture on the part of the Paint Research Council had assisted materially towards that ideal. As a result, every member of the Oil and Colour Chemists' Association in the United Kingdom now received the " Review of Current Literature " of the Research Association of British Paint, Colour and Varnish Manufacturers. Unfortunately, it was not possible to extend the privilege to members resident abroad, that limitation being imposed by the Research Council in the original agreement. It was recalled that public money was involved, and the Research Council could not supply copies to the Association for free distribution abroad at the very special cheap rate contained in the agreement. Appreciation of the attitute of the Research Council was recorded.

Mr. J. A. Frome Wilkinson has been nominated a representative of the Oil and Colour Chemists' Association on the Research Council; and at the association's meeting the rules were altered to enable the Oil and Colour Chemists' Association Council to co-opt a representative of the Research Association. Thus mutual representation will be established.

The Oil and Colour Chemists' Association appointed Mr. W. E. Wornum as research and development officer; many useful liaisons have been made with centres of research work and investigation.

The president, vice-presidents and honorary officers of the association retire annually. The following were elected for the ensuing year:—President, Dr. G. F. New; vice-presidents, Mr. G. A. Campbell, Mr. J. A. Dew, J.P., Mr. A. A. Drummond and Mr. V. G. Jolly; hon. secretary, Mr. A. J. Gibson; hon. treasurer, Mr. H. D. Bradford; research and development officer, Mr. W. E. Wornum.

The ballot for the election of members of council to fill vacancies due to retirements by rotation resulted in the election of Mr. C. W. A. Mundy, Mr. G. C. Attfield, Dr. R. F. Hanstock and Mr. G. N. Hill.

THE establishment of an alkali industry in the Madras Presidency near Mettur, with the assistance of the cheap power supplied by the Mettur hydro-electric scheme, is outlined in a scheme of industrial development prepared by Major Howard, the chief engineer for electricity to the Madras Government. According to him, this industry would be of great economic value to the province and provide caustic soda, bleaching powder, chlorine and hydrogenation of vegetable oils for the manufacture of hydrochloric acid. Oil-pressing plants can also be established and the cake by-product used with nitrate of lime as fertiliser.

Personal Notes

MR. J. A. E. WELLS, foundry manager of Edgar Allen and Co., Ltd., has been appointed to the board.

MR. E. P. BASTIDE, who has been solicitor to the Staveley Coal and Iron Company, Ltd., for some years, has left the company's service and gone into private practice.

MR. WILLIAM R. BLAIN, of 12 Wyresdale Road, Bolton, former president of the Bolton Chamber of Trade, left £18,661 (net personalty £15,411).

MR. HENRY S. PROCTOR, of Braxmere, Belmont Road, Sharples, Bolton, Lancashire, director the Walsden Bleaching and Dyeing Co., Ltd., left £33,382 (net personalty £18,587).

MR. JAMES FERGUSON'S portrait by George Belcher, A.R.A., hangs in this year's Royal Academy. Mr. Ferguson is well known in the rubber industry.

MR. WILLIAM H. BOYES, of Bury, Lancashire, head of the firm of William H. Boyes, bleachers and dyers, Radcliffe, who died on December 11, left estate of the value of £4,697 (net personalty £948).

SIR JOSIAH and LADY STAMP are making a brief visit to Lisbon. On May 6, with the approval of the Portuguese Government, the University conferred upon him the honorary degree of Doctor of Economics.

SIR HECTOR HETHERINGTON, M.A., LL.D., Vice-Chancellor of Liverpool University, has been appointed principal of Glasgow University in succession to Sir Robert Sangster Rait, whose resignation will take effect on September 30.

MISS MARGARET H. C. WISEMAN, B.Sc., Glasgow, has been appointed lecturer in chemistry at Bedford College, London University. She is a native of Arbroath and a graduate of Glasgow University, with first-class honours in chemistry.

PROFESSOR J. H. BURN, Dean of the College of the Pharmaceutical Society since 1933, has been elected an honorary member of the Society. At present the oldest honorary member is Professor H. E. Armstrong, whose name first appeared in the list in 1893.

MR. H. J. PAGE, M.B.E., B.Sc., F.I.C., has been appointed by the High Commissioner for the Malay States to succeed Lieut.-Colonel B. J. Eaton, O.B.E., who is retiring shortly from the post of director of the Rubber Research Institute, Malaya. Mr. Page, who is at present controller of agricultural research at the agricultural research station maintained by Imperial Chemical Industries, Ltd., at Jealotts Hill, will be leaving England for Malaya in July.

SIR HARRY MCGOWAN, chairman of Imperial Chemical Industries, Ltd., has undertaken to contribute the £3,000 to the Extension Fund of the Manchester College of Technology that had been promised by the Broughton Copper Co., Ltd., which has been absorbed by the combine. Alderman S. Woollam, chairman of the Manchester Education Committee, in making this announcement at a meeting in Manchester on Monday, stated that with the accumulated interest on donations received the sum of approximately £100,000 had now been raised as a result of appeal made in 1926.

DR. MAX VON LAUE and PROFESSOR JOHN BERESFORD LEATHES, F.R.S., were recipients of the Honorary Degree of D.Sc., of Manchester University at Founders' Day celebration on Wednesday. Dr. Laue is a Professor of Theoretical Physics in the University of Berlin, and a member of the Preussiche Akademie der Wissenschaften. He has done important work in the field of interference of X-rays in crystals. He was awarded the Nobel Prize for Physics. Professor Leathes, Emeritus Professor of Physiology in the University of Sheffield, was formerly a member of the Medical Research Council. He was a pioneer in the study and teaching of physiological chemistry. He founded an active and important school of pathological chemistry in the University of Toronto.

DR. EZER GRIFFITHS has been elected president of the British Association of Refrigeration.

SIR C. V. RAMAN, F.R.S., has been elected an honorary member of the Royal Irish Academy in the Department of Science.

SIR LOUIS KERSHAW is to join the board of the Burmah Oil Co. to fill the vacancy created by the death of Dr. Leonard Gow.

SIR RICHARD GREGORY, editor of "Nature," uttered a warning of the perils of scientific progress when lecturing at the Royal Institution on May 15, his subject "Science in a Changing World."

DR. A. VICKERS, of Imperial Chemical Industries, Ltd., has recently proved the existence of a large bed of clay at Newfield, Co. Durham, which will be suitable for making terra-cotta bricks as a new industry for the county.

A COMPLIMENTARY DINNER WAS GIVEN at Edinburgh recently to MR. W. A. MACGILLIVRAY, manager of Nobel's Regent Factory, Linlithgow (now transferred to Ardeer Works), who has retired.

MR. SAMUEL COURTAULD, Chairman of Courtaulds, Ltd., responded to the toast of "The Rayon Industry" at a banquet given by British rayon producers on May 18 to inaugurate British Rayon Week.

MR. HENRY N. BENJAMIN, of 15 Chesham Place, London, S.W., a director of the Shell Transport and Trading Co., who died on March 12 last, left gross estate of £156,765, with net personalty £142,913.

DR. HERBERT LEVINSTEIN contributes a special article entitled "To-day and To-morrow" to the Rayon Week Supplement of the "Silk Journal and Rayon World" and the "Textile Recorder" for May. In this article he speculates upon the production of rayon from seaweed and artificial wool from milk.

MR. G. C. HAMPSON, D.PHIL., of St. John's College and Oriel College, Oxford, who has been awarded a Commonwealth Fellowship, was a former pupil of Glossop Grammar School, a Derbyshire Major Scholar. He was awarded a Junior Fellowship at Oriel, and has been engaged in research in physical chemistry. Mr. Hampson's scholarship is tenable at the Californian Institute of Technology.

MR. FRED CLEMENTS, Chesterfield, a director and general manager of the Park Gate Iron and Steel Co., Ltd., has been awarded the Bessemer Gold Medal of the Iron and Steel Institute. The presentation was made by the president, Sir Harold Carpenter, who referred to the valuable scientific papers contributed by Mr. Clements, and to the book on blast furnace practice which he had written, all of which had been translated into many foreign languages.

New German Blue Dye

A Product that is Claimed to be Identical with Monastral Blue

WRITING in the "Chemiker-Zeitung" for May 6, Dr. Hermann Stadlinger describes the new blue dye just introduced by the I.G. Farbenindustrie under the name of Heliogenblau B, which, he says, is the same as the Monastral Blue of the Imperial Chemical Industries, Ltd. It belongs to the comparatively new group named by Linstead the phthalocyanine, owing to their derivation. The structural formula of the new dye is given, and some of its properties, together with a wide range of possible uses, are described. It is said to be particularly valuable for printing inks, for colouring papers, carpets and other textiles, and for synthetic resin products.

From Week to Week

HUMIDIFIERS (GREAT BRITAIN), LTD., 59 Woodlands Road, Isleworth, have changed their name to Homogene Permanent Packing, Ltd., as from May 9, 1936.

THE L.N.E.R. has placed an order for 56,000 gal. of liquid weed killer, which is to be sprayed on railway tracks to keep the ballast free from plants which would impede the drainage of the track.

NEW LABORATORIES, which will ensure absolute purity of food production, were opened by the Earl of Elgin on Monday at the works of Brown and Polson, Ltd., corn-flour manufacturers, Paisley. The new processes introduced are the best equipped of their kind in the country. The new laboratories cover an area five times greater than the former laboratories.

THE FIRST OF 53 COKE OVENS, costing £500,000, built by United Steel Companies, Ltd., for its four blast-furnaces blowing at Workington was lighted on May 19 by Mrs. Robert Crichton, wife of the general manager. Foundations for further extensions of the plant have been laid.

A SHED CONTAINING SEVEN TONS of naphthalene at the Nunnery Colliery, Sheffield, caught fire on May 15, and workmen built an embankment of sand and earth to hold back a stream of burning liquid which threatened three tanks containing 30,000 gal. of benzol. The fire was extinguished by the Sheffield Fire Brigade using foam apparatus. It is believed to have been caused by a spark from a passing locomotive. Near the shed were several railway spirit wagons, one containing 2,500 gal. of benzol. These were hauled away, and the damage was confined to the shed in which the fire originated.

THE NORWEGIAN GOVERNMENT has under consideration the question of granting to the Swedish Match Co. a concession for manufacturing matches in the two Norwegian match plants which are to be taken over by the Swedish Match Co. from the International Match Corporation, according to the proposed settlement plan. One of the two Swedish match companies in Hungary to be taken over in the near future from the International Match, the Szirka Ungarische Zundholzfabriken, reports for the year 1935 net profits of 350,000 pengoes.

WORK IS TO COMMENCE almost immediately on the construction of a new chemistry institute at Glasgow University. The cost of erection and equipment will be £200,000 and the Carnegie Trustees will contribute £118,000. The architect is Professor T. Harold Hughes, F.R.I.B.A. The plans provide for a central administrative block with a room for the Institute of Chemistry, general staff room, and general library, with four units for the departments of inorganic, organic, physical and medical chemistry. The buildings will be erected on University Avenue between the gymnasium and the Western Infirmary.

AN INTERIM REPORT to the shareholders of the British Cyanides Co., states that profits derived from trading during the six months ended March 31 last show a satisfactory increase over those for the corresponding period of the previous year, but the directors state that it is impossible to forecast profits for the year owing to uncertainties in respect of the chemical business. Now that the manufacture of cyanide has been discontinued and, in view of the company's wide concern in plastics, it is thought that a change of name would be beneficial. The suggested new title is "British Industrial Plastics, Ltd.," and a meeting to consider the necessary resolution has been convened for June 5.

THE CHINA CLAY SHIPMENTS FOR APRIL are most encouraging and compared with the corresponding period of 1935 reveal a substantial advance. During April nearly 56,000 tons of shipping were provided at the port of Fowey alone, which is also an index of increased railway traffic. The details of the shipments made are as follows:—Fowey, 40,967 tons of china clay, 3,613 tons of china stone, 2,348 tons of ball clay; Par, 8,166 tons of china clay, 794 tons of china stone; Charlestown, 4,676 tons of china clay, 263 tons of china stone; Padstow, 956 tons of china clay; Looe, 243 tons of china clay; Plymouth, 173 tons of china clay; Newham, 78 tons of china clay; by rail, 5,521 tons of china clay; making a total of 76,798 tons for the month, the totals for each section being 69,780 tons of china clay, 4,670 tons of china stone, and 2,348 tons of ball clay.

ONE MAN WAS KILLED AND TWO WERE INJURED when an oxygen cylinder exploded at the works of the British Oxygen Co., Newcastle, on May 15. The dead man was John Snowden (49), of Shields Road, Walkergate, Newcastle. The injured men are William Kirkup, of Raby Street, Newcastle, who is detained in Newcastle Infirmary, and James Thompson, of Castleside Road, Newcastle, who was allowed to go home after treatment. The men were soldering a copper casing in the repair department when there was an explosion. Snowden, who was standing in front of the casing, was struck on the head by some copper trays and thrown to the ground. He died shortly after. This is the first fatal accident which has occurred at the works in a period of twenty-four years.

NORTH BRITISH RAYON, LTD., now have their offices at Cliffords Inn, London, E.C.4. Telegraphic address: Norbrisilk, Fleet, London. Telephone: Holborn 5661 (unchanged).

THE NOMINAL CAPITAL of Antizorb, Ltd., dealers in oils and colours, chemical substances, etc., Birmingham, has been increased by the addition of £900 in £1 ordinary shares of £100.

FIRE BROKE OUT ON THE PREMISES of the Dunlop Rubber Co., Ltd., Cambridge Street, Manchester, on Wednesday. The fourth and fifth floors were well alight when the Manchester Fire Brigade arrived. They soon had the outbreak under control.

MR. JUSTICE CLAUSON, in the Chancery Division, on Wednesday, confirmed a reduction of the capital of United Egyptian Salt, Ltd., from £75,000 to £15,000 by returning £60,000 capital in excess of the wants of the company.

THE EXPLOSIVES DENABY POWDER No. 2, Denaby powder No. 2 (sheathed), Bellite No. 2 and Bellite No. 2 (sheathed), manufactured by Roburite and Ammonal, Ltd., at Gathurst, near Wigan, have been added to the list of permitted explosives for general use in mines in which Part II of the Explosives in Coal Mines Order applies. The sheaths are of powdered sodium bicarbonate.

TO ILLUSTRATE THE POSSIBILITY of suction gas as an alternative to petrol or diesel oil, and the consequent existence of a new market for semi-coke or smokeless fuel, the Duke of Montrose is arranging for a fully-loaded gas-propelled 2-ton lorry to run from London to Glasgow and back. He hopes to demonstrate thus a substantial saving in running costs over both petrol and diesel engines.

A REPRESENTATION HAS BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption from Key Industry Duty of gas analysis apparatus combined with a bridge potentiometer, adapted for the estimation and continuous record of nitric oxide in gases, wherein the nitric oxide is absorbed in a suitable liquid, the depth of colour generated therein being measured photo-electrically. Any communications should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, by June 19.

A VERDICT OF DEATH BY MISADVENTURE was returned at an inquest at Widnes last week on William Leather, 39, a steam crane driver, who was killed at the Marsh Works of Imperial Chemical Industries (General Chemical Group). The evidence showed that Leather was operating the crane, which was loading burnt ore into railway wagons, when it toppled over and crushed him to death. The crane was subject to fortnightly inspections and fitted with a safe load indicator, but in the opinion of Mr. C. G. Gates, a factory inspector, the crane was overloaded on this occasion and Leather was taking a chance.

THE METROPOLITAN WATER BOARD on May 15 considered a report on a proposal to erect new laboratories on a portion of the site of New River Head at a cost of £62,840. Last January the Board voted £69,816 for the provision of new laboratories on a portion of its own land at Barrow Hill, Regent's Park. As the result of trial borings it was considered inadvisable to utilise the site. It was now recommended that the laboratories should be erected at Rosebery Avenue on the site to the north-east of the existing head office away from the main road. The money was voted; drawings by Mr. J. Murray Easton, F.R.I.B.A., were approved; and Messrs. Stanley Hall and Easton and Robertson were appointed architects.

AT THE INVITATION OF THE SALT UNION, the Lord Mayor of Liverpool (Councillor R. J. Hall) recently paid a visit to the Cheshire salt works at Winsford, one of the most important of the salt-producing centres in the country. The Lord Mayor's tour of the works and inspection of the processes used in salt production were made in company with Mr. F. W. Clark, chairman of the Salt Union; Mr. R. G. Barton, one of its directors; Mr. Calder, the works manager, and a number of departmental heads. At the conclusion the visitor said he could imagine no foodstuffs produced under more hygienic conditions than those he had witnessed, neither had he seen more contented employees in any industrial establishment.

A STRIKE OF 2,000 COKE WORKERS which was threatened following a dispute with the employers will not take place, two-thirds of the men having withdrawn their notices terminating their employment. The dispute arose between the Durham members of the National Union of Coke Oven and By-Product Workers and the Durham coking firms because it was alleged some employers were forcing their workmen to draw 14 to 15 ovens a shift against the recognised standard of 13 ovens. Men working the usual 13 ovens decided to strike in support of their colleagues who they alleged were being victimised. It is understood, however, that the men directly involved made no attempt to strike themselves, and their supporters have now withdrawn their notices. In the meantime negotiations are being continued between workers and employers.

Chemical and Allied Stocks and Shares

DESPITE the commencement of a new Stock Exchange account on Monday, most sections of the stock and share markets have been dull and inactive with a general tendency for prices to move moderately against holders. In the circumstances shares of chemical and allied companies have held up relatively well. B. Laporte were very firm on the good impression created by the annual report, which shows an increase in profits from £77,104 to £94,246. The larger dividend of 22½ per cent. requires £32,002, and £22,223 is placed to reserve, while the carry forward is higher at £24,583, compared with £22,797. The directors state that there has been a satisfactory increase in the total volume of business and that this improvement affects almost every product manufactured by the company. Borax Consolidated deferred were a good feature on further consideration of the recent statement as to the company's progress which accompanied the offer of additional shares to shareholders on favourable terms. The issue was oversubscribed. The view in the market is that despite the larger capital ranking there are still good possibilities of an increase in the dividend for the year from 5 per cent. to 7½ per cent., and that there may be an interim dividend payment in September. Distillers were also prominently active on continued talk of a larger dividend or of a possible share bonus. The company has large reserves and could distribute a bonus whenever this were considered opportune, but it has to be remembered that it is the policy of the directors to provide for expansion of business out of resources. The development of the industrial alcohol side of the business was effected without the raising of additional capital. Imperial Chemical were steady, accompanied by reports that the output of the Billingham oil-from-coal plant is to be increased. British Glues were unchanged and have continued to be held steadily on the belief that the resumption of dividends is likely to be announced next month or early in July. Boots Pure Drug were less active, awaiting the full report and annual meeting. United Water Softeners were again higher at Birmingham where business was recorded up to 31s. Chloride Electrical Storage have reacted very sharply on balance for the week, market hopes of a larger dividend or a share bonus having been disappointed. Profits show a further good advance and it is apparent that the directors are following a very conservative policy. Triplex Safety Glass were steady on talk that the sum arising from the windfall from America, reference to which was made by the directors a few months back, may permit of a good bonus later this year. International Combustion continued active in view of the favourable dividend estimates and Bennis Combustion were steady. The latter company has already paid an interim dividend of 5 per cent., and the market is talking of a total dividend of 12½ per cent., which would imply a final payment of 7½ per cent. Imperial Smelting continued to show a satisfactory tendency on the view that if hopes of a 5 per cent. dividend were realised a rise in the shares to par would apparently be justified. British Cotton and Wool Dyers were under the influence of the larger dividend and the increased profits, which created a good impression in view of the difficult conditions which have ruled in the textile industry generally. British Cyanides did not benefit quotably from the recently-issued progress report. Although it indicated that favourable progress is being made there was apparently a certain amount of disappointment in the market that resumption of the custom of paying an interim dividend was not announced at the same time. Courtaulds developed a better tendency, on the excellent long term prospects of the rayon industry, emphasised by "National Rayon Week." United Molasses were rather less active. United Glass Bottle ordinary shares were steady as were Salt Union. Dorman Long were relatively firm, but shares of most iron and steel companies have made rather lower prices as it is being feared that this year there may not be many really large increases in dividend. This is due to the possibility that profits may be dealt with conservatively as a result of the large amounts which may have to be expended on new plant to provide for the expanding demand for steel. Associated Portland Cement were firm and Pinchin Johnson were favoured. Oil shares have not kept best prices but were again active on dividend considerations. The Burmah Oil dividend was up to best expectations.

Name.	May 20.	May 13.
Anglo-Iranian Oil Co., Ltd. Ord.	95/7½	94/4½
Associated Dyers and Cleaners, Ltd. Ord.	1/3	1/3
Associated Portland Cement Manufacturers, Ltd. Ord.	86/3	86/10½
,, 5½% Cum. Pref.	28/9	28/9
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	6/3	6/3
Berger (Lewis) & Sons, Ltd. Ord.	68/1½	68/1½
Bleachers' Association, Ltd. Ord.	5/-	5/7½
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	20/-	20/-
Boots Pure Drug Co., Ltd. Ord. (5/-)	53/6	54/6
Borax Consolidated, Ltd. Pfd. Ord. (£)	110/-	112/6
,, Defd. Ord.	28/9	28/9
,, 5½% Cum. Pref. (£10)	£11/17/6	£11/15/-
Bradford Dyers' Association, Ltd. Ord.	7/10	8/1½
British Celanese, Ltd. 7% 1st Cum. Pfd.	23/-	23/3
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/9	5/9
British Cyanides Co., Ltd., Ord. (2/-)	3/9	3/9
British Drug Houses, Ltd. Ord.	20/-	20/-
,, 5% Cum. Pref.	22/6	22/6
British Glues and Chemicals, Ltd. Ord. (4/-)	9/9	10/3
,, 8% Pref. (Cum. and Part.)	30/-	30/-
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	49/-	49/-
British Oxygen Co., Ltd. Ord.	88/9	91/3
,, 6½% Cum. Pref.	34/4½	33/9
British Portland Cement Manufacturers, Ltd. Ord.	93/9	93/9
Bryant & May, Ltd. Pref.	67/6	66/3
Burt, Boulton & Haywood, Ltd. Ord.	21/3	21/3
,, 7% Cum. Pref.	28/9	28/9
,, **6% 1st Mort. Deb. Red. (£100)**	£102/10/-	£102/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	108/9	108/9
,, 4% 1st Mort. Deb. Red. (£100)	£94/10/-	£94/10/-
Calico Printers' Association, Ltd. Ord.	7/1½	7/6
Cellulose Acetate Silk Co., Ltd. Ord.	10/11¼	10/11¼
Consett Iron Co., Ltd. Ord.	10/6	10/9
Cooper, McDougall & Robertson, Ltd. Ord.	35/-	35/-
,, 7% Cum. Pref.	28/9	28/9
Courtaulds, Ltd. Ord.	48/9	48/9
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	25/-
Distillers Co., Ltd. Ord.	103/6	102/-
,, 6% Pref. Stock Cum.	31/6	31/6
Dorman Long & Co., Ltd. Ord.	31/-	32/6
English Velvet & Cord Dyers' Association Ltd. Ord.	3/9	3/9

Name.	May 20.	May 13.
Fison, Packard & Prentice, Ltd. Ord.	44/4½	44/4½
,, 7% Non-Cum. Pref.	31/3	31/3
,, **4½% Debs. (Reg.) Red. (£100)**	£106	£106
Gas Light and Coke Co.	28/3	28/3
,, 4% Consolidated Pref. Stock (£100)	£106/10/-	£106/10/-
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	14/4½	14/4½
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	28/9	28/9
Gossage, William, & Sons, Ltd. 6½% Cum. Pref.	24/4½	24/4½
Imperial Chemical Industries, Ltd. Ord.	39/-	39/3
,, Deferred (10/-)	9/4½	9/7½
,, 7% Cum. Pref.	34/9	34/9
Imperial Smelting Corporation, Ltd. Ord.	16/3	17/6
International Nickel Co. of Canada, Ltd. Cum.	$46⅞	$45
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-
Laporte, B., Ltd. Ord.	113/9	117/6
Lawes Chemical Co., Ltd. Ord. (10/-)	8/9	8/9
,, **7% Non-Cum. Part Pref. (10/-)**	10/-	10/-
Lever Bros., Ltd. 7% Cum. Pref.	34/-	33/9
Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
,, 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st Debs. (Reg.)	£35	£35
Major & Co., Ltd. Ord. (5/-)	7½d.	7½d.
,, 8% Part. Prefd. Ord. (10/-)	9d.	9d.
,, **7½% Cum. Pref.**	1/6¾	1/6¾
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	46/6	45/6
Potash Syndicate of Germany 7% Gld. Ln. Sr. "A" and "B" Rd.	£77	£78
Reckitt & Sons, Ltd. Ord.	115/-	115/-
Salt Union, Ltd. Ord.	45/-	45/-
,, Pref.	47/6	47/6
South Metropolitan Gas Co. Ord. (£100)	£125/10/-	£125/10/-
Staveley Coal and Iron Co., Ltd. Ord.	53/9	53/9
Stevenson & Howell, Ltd. 6½% Cum. Pref.	26/3	26/3
Triplex Safety Glass Co., Ltd. Ord. (10/-)	93/1½	91/10½
Unilever, Ltd. Ord.	32/6	31/3
United Glass Bottle Manufacturers, Ltd. Ord.	46/3	46/3
United Molasses Co., Ltd. Ord. (6/8)	24/4½	24/4½
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	10/7½	10/7½

Weekly Prices of British Chemical Products

PRICES of general heavy chemicals, rubber chemicals, wood distillation products, pharmaceutical and photographic materials, perfumery chemicals, essential oils and intermediates, have remained practically unchanged during the week. In the coal tar products market the prices of various grades of cresylic acid have been advanced, while solvent naphtha and pyridine have shown slight reductions. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

LONDON.—Prices in the London chemical market still remain steady with a fair general demand.

MANCHESTER.—Operations on the Manchester chemical market during the past week have pursued a somewhat humdrum course. There has been a moderate weight of prompt and early delivery business in a fairly wide range of heavy chemical products, but the number of additional contracts, although a few have been reported for delivery over the second half of the year, has been of relatively little consequence. In most branches of the consuming industries in Lancashire and West Yorkshire the call for deliveries against contracts of the leading alkalies, the heavy acids, and certain of the ammonia and magnesia products, as well as a miscellaneous range of chemicals, has been on fairly satisfactory lines, and in the aggregate the quantities taken up this month compare favourably with any previous month this year.

SCOTLAND.—There has been a slight improvement in the demand for chemicals for home trade during the week, but export business has been limited. Prices generally continue firm at about previous figures with no important changes to report.

General Chemicals

ACETONE.—LONDON: £62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—40% technical, £16 12s. 6d. per ton. LONDON: Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £48 to £50.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, £28; powdered, £29.

ACID, CHROMIC.—Flaked, 10d. per lb., less 2½%; ground, 10¼d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 1s. SCOTLAND: 11¾d.

ACID, CRESYLIC.—97/100%, 1s. 5d. to 1s. 6d. per gal.; 99/100%, refined, 1s. 9d. to 1s. 10d. per gal. LONDON: 98/100%, 1s. 5d. f.o.r.; dark, 1s.

ACID, FORMIC.—LONDON: £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £48 10s. to £55 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. LONDON: 11¼d., less 5%. SCOTLAND: 1s. 0¼d. less 5%. MANCHESTER: 11¾d. to 1s. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £7 per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £15 per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £10 10s. to £10 15s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £9 5s.

BORAX. COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—5s. 1d. to 5s. 4d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¼d. per lb. LONDON: 4¼d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2¾d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 16s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£40 to £43 per ton.

LEAD ACETATE.—LONDON: White, £36 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £36; brown, £35.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £26 to £28 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 5s. to £16 10s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PHENOL.—6¾d. to 7¼d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5¼d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £39.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. crystals, 10d. to 10¼d. MANCHESTER: B.P., 11¼d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8¼d. ex store. MANCHESTER: Yellow, 8¼d. to 8¾d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £20 15s.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANLHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.— £29 per ton. SCOTLAND: 3⅜d. per lb.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHATE OF COPPER.—MANCHESTER: £15 per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 1d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£7 5s. per ton for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CALCIUM CYANAMIDE.—£7 5s. per ton, delivered in 4-ton lots.

NITRO-CHALK.—£7 5s. per ton delivered in 6-ton lots to farmer's nearest station.

NITRATE OF SODA.—£7 12s. 6d. per ton delivered in 6-ton lots to farmer's nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 10s. to £10 19s. per ton according to analysis, delivered in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE (N.P.) FERTILISERS.—£10 5s. to £13 15s. per ton according to analysis, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 2s. 5d. to 2s. 7d. per gal.; 99/100%, 3s. to 3s. 6d. per gal., according to specification; pale 98%, 2s. 7d. to 2s. 9d.; dark, 1s. 10d. to 1s. 11d. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's 2s. 3d. to 2s. 6d. per gal. MANCHESTER: Crystals, 7d. per lb.; crude, 2s. 2d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s 3½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 5½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 5d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/100%, 1s. 5½d. to 1s. 6¼d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £17 10s. per ton; purified crystals, £28 to £29 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PYRIDINE.—90/140%, 5s. to 7s. 6d. per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 7d.

XYLOL.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d.

PITCH.—Medium, soft, 37s. 6d. per ton, in bulk at makers works. MANCHESTER: 30s. to 32s. 6d. f.o.b., East Coast.

Latest Oil Prices

LONDON, May 20.—LINSEED OIL was slow. Spot, £27 per ton (small quantities); June, £24 10s.; July-Aug., £24 12s. 6d.; Sept.-Dec., £24 15s.; Jan.-April, £24 17s. 6d., naked. SOYA BEAN OIL was quiet. Oriental (bulk), afloat, £21 7s. 6d. per ton. RAPE OIL was slow. Crude extracted, £34 per ton; technical refined, £35 10s., naked, ex wharf. COTTON OIL was dull. Egyptian crude, £24 per ton; refined common edible, £27; and deodorised, £29, nakede, ex mill (small lots £1 10s. extra). TURPENTINE was steady. American, spot, 39s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £25 7s. 6d. per ton; May and June-Aug., £24 15s.; Sept.-Dec., £24 17s. 6d. COTTON OIL.—Egyptian, crude, spot, £24 10s. per ton; edible, refined, spot, £27; technical, spot, £27; deodorised, £29, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £19 10s. per ton, naked. GROUNDNUT OIL.—Extracted, spot, £30 10s. per ton; deodorised, £33 10s. RAPE OIL.—Extracted, spot, £33 per ton; refined, £34 10s. SOYA OIL.—Extracted, spot, £25 10s. per ton; deodorised, £28 10s. COD OIL, F.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 42s. 6d. per cwt.: first, 37s. 6d.; second, 35s. 6d. TURPENTINE.—American, spot, 42s. per cwt.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Inteiligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—The director of Contracts, A.H.Q., Simla, invites tenders for 50,000 lb. boric acid, commercial quality. Forms of tender obtainable from the Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, at a fee of 5s., which will not be returned. Tenders must provide for delivery of the stores in India and for payment in India in rupees. Any tender which does not comply with these conditions will not be considered. Tenders must be sent direct to the Director of Contracts, A.H.Q., Simla, to reach him not later than 4 p.m., Indian standard time, May 29.

India and Burma.—An Indian firm established at Bombay wishes to obtain the representation on a consignment or purchasing basis, of United Kingdom manufacturers of pharmaceutical preparations. (Ref. No. 400.)

Belgium.—An agent and manufacturers' representative established at Antwerp wishes to obtain representation, on a commission basis, of United Kingdom manufacturers of pharmaceutical products; patent medicines; fine chemicals; varnishes, lacquers and oils; machinery for chocolate confectionery and biscuits; various packing materials including aluminium foil and papers for chocolates and biscuits, and cocoa butter for making chocolate. (Ref. No. 402.)

Switzerland.—A merchant firm established at Zurich wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of zinc powder, pure naphthalene, pyridine, acetone, sodium sulphate, caustic potash, potassium bichromate, sodium bisulphite, tar, soft pitch, pure toluol, xylol benzol, pure benzol, solvent naphtha and carbolineum. (Ref. No. 409.

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Ministry of Public Works is calling for tenders, to be presented in Cairo by June 20, 1936, for the supply of a portable fire extinguishing pumping set. (Ref. T.Y. 30220.)

Estonia.—An agent in Tallinn wishes to represent United Kingdom manufacturers of drugs, chemicals and resins on a commission basis. (Ref. No. 404.)

New Companies Registered

The Wool Dyers' and Finishers' Association, Ltd.—Registered May 18. Nominal capital £1,000. To operate arrangements for the equitable distribution of trade in the wool dyeing and finishing industry and allied industries, and any pooling, quota, profit-sharing or price standardisation schemes; to assist the said industries by the purchase of redundant and obsolete plant and machinery and factories, the dismantling and disposal of their contents and the resale of sites under restrictions against further use of the said industries or otherwise, etc. A subscriber: Harry Golden, 11 Sandringham Road, Bradford, Yorks.

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

CONDENSATION PRODUCTS from oxy- and amino-derivatives of pyrene and chrysene, manufacture.—I. G. Farbenindustrie. Nov. 9, 1934. 27317/35.

DIALKYL ETHERS OF GLYCOL, preparation.—Carbide & Carbon Chemicals Corporation. Nov. 9, 1934. 27731/35.

TITANIUM DIOXIDE, method of treating.—American Zinc, Lead, and Smelting Co. Nov. 5, 1934. 29107/35.

METALLIC MAGNESIUM, production.—Oesterreichisch Amerikanische Magnesit A.-G. Nov. 5, 1934. 29299/35.

DESULPHURISING GASES, process.—Studien-Und Verwertungsges. Nov. 5, 1934. 29953/35.

AZO DYESTUFFS, manufacture.—J. R. Geigy, A.-G. Nov. 5, 1934. 30437/35.

MERCERIZATION.—Soc. of Chemical Industry in Basle. Nov. 7, 1934. 30438/35.

DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Nov. 8, 1934. 30439/35.

NITRO-AZO DYESTUFFS CONTAINING METAL, manufacture.—I. G. Farbenindustrie. Nov. 6, 1934. 30617/35.

RESINOUS CONDENSATION PRODUCTS, preparation.—Bee, Koller, & Co. (England), Ltd. Nov. 6, 1934. 30629/35.

PHYSIOLOGICALLY-ACTIVE PREPARATIONS and the manufacturing thereof.—Syngala, Fabrik Für Chemisch-Synthetische und Galenische Arzneimittel Ges. Nov. 9, 1934. 30723/35.

PLASTIC MASSES, process for preparing.—Beck, Koller and Co. (England), Ltd. Nov. 6, 1934. 30745/35.

RESIN-LIKE CONDENSATION PRODUCTS, manufacture.—Deutsche Hydrierwerke, A.-G. Nov. 6, 1934. 30748/35.

GELATINE AND GLUE COMPOSITIONS.—E. I. du Pont de Nemours and Co. Nov. 8, 1934. 30840/35.

IRON FERROCYANIDE PIGMENTS.—Imperial Chemical Industries, Ltd. Nov. 7, 1934. 30841/35.

GASEFICATION OF MINERAL OILS, process.—C. Padovani. Nov. 8, 1934. 30895/35.

ESTERS OF ACIDS OF PHOSPHORUS, manufacture.—E. I. du Pont de Nemours and Co. Nov. 10, 1934. 30896/35.

DYED ARTIFICIAL MASSES from regenerated cellulose.—I. G. Farbenindustrie. Nov. 9, 1934. 30968/35.

PURIFIED GLYCYRRHIZINE (pale glycyrrhizine), process of preparing.—Etablissements Sareb Soc. Anon. Nov. 10, 1934. 31151/35.

ALKYLENE SULPHIDES, manufacture.—I. G. Farbenindustrie. Nov. 10, 1934. 31154/35.

NITROCELLULOSE COMPOSITIONS, manufacture.—Celluloid Corporation. Nov. 9, 1934. 31202/35.

Specifications Accepted with Date of Application

DI-ARYL-METHANES AND THEIR DERIVATIVES, manufacture.—W. Blythe and Co., Ltd., W. H. Bentley and B. Catlow. Dec. 29, 1934. 446,450.

DYEING LEATHER, process.—Soc. of Chemical Industry in Basle. Nov. 24, 1934. 446,595.

HORMONES, production.—Schering-Kahlbaum A.-G. Jan. 16, 1934. 446,536.

HORMONES, production.—Schering-Kahlbaum A.-G. Sept. 15, 1934. 446,537.

TRULY COLLOIDAL FUEL, process and apparatus for production.—E. Blümner. Jan. 21, 1935. 446,357.

CENTRIFUGAL DE-WAXING OF OILS.—Standard Oil Development Co. June 14, 1934. 446,607.

CENTRIFUGAL SEPARATION OF MATERIALS.—Standard Oil Development Co. July 19, 1934. 446,608.

INSECTICIDE AND ANTICRYPTOGAMIC PRODUCTS of nicotine base and method of preparing the same.—C. de Gendre and P. Bary. May 22, 1935. 446,368.

BORATES OF ZINC, TIN OR COPPER, production.—L. Ferri. June 7, 1934. 446,373.

EMULSIFICATION OF OILS.—C. Arnold (Standard Oil Development Co.). June 4, 1935. 446,314.

PRINTING TEXTILE PRODUCTS.—Soc. of Chemical Industry in Basle. June 27, 1934. 446,381.

ACTIVATED CARBON IN GRANULAR FORM, production.—G. Cardile and E. Gardiol (trading as Soc. Per L'Industria Articoli Caoutchouc E Per Materiali Protettivi Ed Antigas, I. A. C.). July 4, 1934. 446,385.

ALIPHATIC ALCOHOLS, manufacture.—Standard Alcohol Co. Oct. 9, 1934. 446,614.

DARK ELECTROLYTIC DEPOSITS OF RHODIUM, method for production.—W. C. Heraeus Ges. June 4, 1935. 446,393.

DISTILLATION OF COAL.—A. Roberts and C. W. Smith (Legal representatives of A. A. Roberts (deceased)), and J. E. Hackford. July 26, 1934. 446,616.

BENZINE WITH A HIGH ANTI-KNOCK VALUE from benzine with a low anti-knock value, process for manufacturing.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Sept. 21, 1934. 446,621.

DEPOLARISING COMPOSITIONS from native manganese dioxide, *e.g.*, pyrolusite, production.—I. G. Farbenindustrie. Dec. 24, 1934. 446,624.

ZINC SULPHIDE.—New Jersey Zinc Co. Jan. 24, 1935. 446,330.

HALOGENATED HYDROCARBONS, process for manufacturing.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Feb. 2, 1935. 446,411.

ACYL OCTAHYDRO FOLLICLE HORMONES, manufacture.—Schering-Kahlbaum A.-G. Nov. 9, 1934. 446,641.

PRINTING WITH VAT DYESTUFFS.—W. W. Groves and I. G. Farbenindustrie. Aug. 22, 1934. 446,488.

TREATMENT OF DRYING OR SEMI-DRYING OILS to produce substances for use in paint, enamel, lacquer or like protective coating-compositions.—A. H. Stevens (Congoleum-Nairn, Inc.). July 26, 1934. 446,658.

Applications for Patents

(May 7 to 13 inclusive.)

LUBRICATING OILS, production.—G. W. Johnson (I. G. Farbenindustrie). 12071.

CARBONACEOUS SUBSTANCES, hydrogenation.—G. W. Johnson (I. G. Farbenindustrie). 12072.

NITROGENOUS CONDENSATION PRODUCTS, production.—G. W. Johnson (I. G. Farbenindustriee). 12177.

CARBONS FROM COAL, production.—J. G. King. 11889.

SYNTHETIC OIL, production.—W. W. Myddleton. 11911.

CAUSTIC SODA SOLUTIONS, purification.—Pennsylvania Salt Manufacturing Co. (United States, April 27, '35.) 11648.

ACETIC ANHYDRIDE, production.—H. E. Potts (Shawinigan Chemicals, Ltd.). 11662.

CRUDE PHOSPHORIC ACID, purificaition.—Pulverfabrik Skodawerk-Wetzler. (Austria, April 30, '35.) 11697.

SYNTHETIC OIL, production.—Robinson Bindley Processes, Ltd. 11911.

LATEX, concentration.—Rubber Producers' Research Association (E. Rhodes and J. H. Piddlesden). 12053.

FATTY OIL POLYMERS.—Standard Oil Development Co. (United States, Sept. 14, '35.) 12193.

CLARIFICATION OF WORTS.—Aluminium Plant and Vessel Co. 12403.

ZINC OXIDE, ETC., manufacture.—G. Antonoff. 12433.

SUBSTITUTED PHENOLS, ETC., production.—Beck, Koller and Co. (England), Ltd. (Austria, May 7, '35.) 12628.

ALGINIC SOLS, preparation.—C. W. Bonniksen. 12463.

DIAZO COMPOUNDS, manufacture.—Calico Printers' Association, Ltd., and J. S. Heaton. 12467.

METALLIC DUST, production.—H. V. Casson (Electrolytic Zinc Co. of Australasia, Ltd.). 12290.

INSECTICIDES.—Clorox Chemical Co. (United States, May 6, '35.) 12349.

IRON FROM IRON ORE, production.—F. L. Duffield. 12740.

PHENOL ALDEHYDE CONDENSATION PRODUCTS.—E. I. du Pont de Nemours and Co. (United States, May 1, '35.) 12444.

MEANS FOR SOFTENING NITROCELLULOSE PLASTICS, etc.—E. I. du Pont de Nemours and Co. (United States, May 9, '35.) 12739.

FRACTIONAL DISTILLATION.—Foster Wheeler, Ltd. (United States, May 3, '35.) 12561.

CHROMABLE DYESTUFFS of triarylmethane series, manufacture.—W. W. Groves (I. G. Farbenindustrie). 12432.

EXTIRPATION OF RODENTS.—I. G. Farbenindustrie. (Germany, May 8, '35.) 12570.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, June 6, '35.) 12571.

MONOAZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, May 9, '35.) 12826.

ZINC PLATING.—Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours and Co.). 12738.

HYDROXYALKYL ETHERS containing halogen, production.—G. W. Johnson (I. G. Farbenindustrie). 12305.

DYESTUFFS, production.—G. W. Johnson (I.G. Farbenindustrie). 12306.

ACETALDEHYDE FROM ACETYLENE, production.—G. W. Johnson (I. G. Farbenindustrie). 12794.

DEHYDRATION OF MAGNESIUM CHLORIDE, apparatus for.—Magall Akt.-Ges. (Austria, Nov. 23, '35.) 12391.

CHLORINATION OF RUBBER, processes for.—N. Strachovsky and G. Watteley. 12370.

RUBBERLIKE CHLORO-2-BUTADIENE-1, 3 POLYMERS.—United States Rubber Products, Inc., (United States, May 4, '35). 12575, 12576.

LOW TEMPERATURE CARBONISATION, ETC.—C. H. Verity. 12742

Forthcoming Events

LONDON

May 26.—Institution of Civil Engineers. "Recent Developments in Metallurgy, and their Influence on Engineering." Mons. Charles Eugene Schneider. 6 p.m. Great George Street, London, S.W.1.

May 28.—The Chemical Society. Fifth Pedler Lecture. "Synthesis in Biochemistry." Professor R. Robinson. 5.30 p.m. Institution of Mechanical Engineers, Storey's Gate, London.

Company News

Fison, Packard and Prentice.—The directors have declared 2½ per cent., less tax, on ordinary shares, payable on June 17.

Sudan Salt Co.—The profit for 1935 amounted to £16,740; deduct £3,074 written off preliminary expenses, and £12,396 debit balance for 1934, leaving £1,270 to be carried forward.

"Shell" Transport and Trading Co.—A dividend of 17½ per cent., tax free, compared with 12½ per cent. for 1934 and 7½ per cent. for each of the three preceding years, is announced.

Metal Industries, Ltd.—A fourth interim dividend is announced for the year to March 31 last of 2½ per cent. on the "A" and "B" stocks, less tax at 4s. 9d. in the £, payable on June 1 to stockholders on the register on May 15. This makes a total distribution to date for that year of 9½ per cent. In 1934-35 a total of 5 per cent. was paid.

Park Gate Iron and Steel Co.—Gross profits for the year to March 31 last were well maintained at £112,312, compared with £110,837 in 1934-1935. Depreciation takes £40,000, against £35,000, and the dividend is repeated at 3 per cent., less tax. Reserve receives £25,000, against £20,000, and the carry-forward is up from £25,085, to £28,196.

British Tyre and Rubber Co.—The directors have declared an interim dividend on the ordinary shares of 3½ per cent. actual, less tax, for the year ending September 30 next. A similar interim was paid last year, followed by a final of 4½ per cent., plus a bonus of 1½ per cent., making a total of 9½ per cent. The directors also declare a dividend on the 7½ per cent. cumulative preference shares for the six months ending May 31.

B. Laporte, Ltd.—In the year to March 31, 1936, the net balance amounted to £94,246—£17,142 more than in the previous year. Increased allocations are made to the various reserves, the general fund receiving £22,223, against £17,705, tax reserve £19,000, against £11,000, and the investment reserve £2,000, compared with £1,000. The ordinary dividend is raised from 20 per cent. to 22½ per cent., a final of 17½ per cent. being payable at the end of this month. After these allocations a surplus of £24,583 remains to go forward, compared with £22,797 brought in.

British Cotton and Wool Dyers Association.—Increased profits are shown in the report for the year to March 31 last. Net profit is given as £75,325, compared with £60,723 the previous year. The available balance is £120,544. The dividend on the ordinary shares has been raised to 6¾ per cent., against 5 per cent. The depreciation fund receives £25,000, bringing it up to £232,336, and the obsolescence fund receives £18,395, leaving a balance to go forward of £50,538. The previous year £16,895 was transferred to the obsolescence fund, £2,693 to the depreciation fund, and £47,319 was carried forward.

British Cyanides, Ltd.—In a progress report covering the six months to March 31 last, it is stated that trading profits show a satisfactory increase over 1934-35, although "it is impossible to forecast profits for the year." In the first quarter "business progressed normally," but since Christmas chemical business has suffered from a steady increase in competition and declining demands "at a time when raw material and labour costs are rising." On the other hand, sales of Beetle moulding powder were exceptionally good in the first quarter. An extension of the Oldbury plant should be completed by June. The directors have also sanctioned the erection of a new factory at Birmingham to manufacture moulds for the plastics industry. The new factory will replace manufacture at Streetley. The net profit for the year to September 30 last was £25,726, and the ordinary dividend was 8 per cent.

Burmah Oil Co.—A final dividend is announced for 1935 of 16½ per cent., making, with the interim dividend, a total of 20 per cent., against 15 per cent. for 1934. The final dividend is subject to tax at 3s. 3d. in the £, being amount of British income tax, less relief in respect of Dominion income tax. After charging direct to profit and loss fields expenditure, charging depreciation on refineries, pipe lines, tanker and tank installations amounting to £330,000, against £395,000, and allowing for income tax and all other charges, the profit amounts to £2,276,913, compared with £1,657,218—a rise of £619,695. There is placed to fields expenditure equalisation reserve account £260,234, thus putting back the amount which was drawn from it for special expenditure in 1934, again allocating £200,000 to general reserve and providing for the final dividend, there remains to be carried forward £634,994, against £611,517 brought in.

The Sunlicht Co. of Berlin.—This German subsidiary of the Unilever group reports a net profit of Rm.429,081 for 1935, which is used to distribute a dividend of 6 per cent. on the preference shares and 5 per cent. on the ordinary, the same as a year ago.

British Alkaloids.—The net profit for the year to March 31 last was £29,361; to this is added £679 brought in, making £30,038. The amount written off advertising account is £10,500; to general reserve, £4,500; tax reserve £1,500, dividend, 15.08 per cent., less tax, on amount paid up on participating preference and 22 per cent., less tax, on ordinary, leaving to go forward, £2,148, subject to directors' additional remuneration.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt as specified in the last available Annual Summary, is also given marked with an *—followed by the date of the Summary, but such total may have been reduced.)

Satisfactions

GRIMSHAW BROTHERS AND CO., LTD., Manchester, chemical manufacturers. (M.S., 23/5/36.) Satisfaction registered May 12, of mortgage registered June 23, 1931.

SAUNDERS VALVE CO., LTD., Wolverhampton. (M.S., 23/5/36.) Satisfaction registered May 9, £2,500, registered August 25, 1934.

SHELTON IRON, STEEL AND COAL CO., LTD., Stoke-on-Trent. (M.S., 23/5/36.) Satisfaction registered May 8, £250,000, registered May 25, 1904.

SILVER PALLADIUM, LTD., London, W. (M.S., 23/5/36.) Satisfaction registered May 13, of charge registered September 7, 1929.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

STANSFIELD, JNO., 4 Lansdowne Road, Higher Crumpsall, Lancashire, oil and chemical merchant. (C.C., 23/5/36.) £17 15s. 10d. April 15.

TIMMINS-GRANT, ROBT., 14 Ipswich Road, Holbrook, Suffolk, technical chemist. (C.C., 23/5/36.) £39 9s. 10. April 8.

Company Winding-Up

THE WINCHESTER CHEMICAL CO., LTD. (C.W.U., 23/5/36. Statutory meetings at 33 Carey Street, Lincoln's Inn, London, W.C.2, May 29; creditors at 11.30 a.m.; contributories at 12 noon.

Bankruptcy Proceedings

WILLIAM TAYLOR, Jackson Street, Albert Road, Farnworth, Lancs., trading as Wm. Taylor and Sons, soap manufacturers. This debtor filed his own petition, and he has returned a statement of affairs showing gross liabilities of £3,677 5s. 1d., of which £3,273 3s. 4d. is expected to rank for dividend, with net assets of £435 13s. 10d., or a deficiency of £2,837 9s. 6d. The debtor commenced trading on his own account as a soap manufacturer in 1919, with a capital of about £3,000, represented by shares and house property. He realised £2,000 from the sale of his shares and expended £1,400 on plant and trade requisites. During the first year he made a profit of about £100, but after that he traded at a loss owing to increased production expenses following the decontrol of seed oils, and in 1922, being without cash resources, he began borrowing from friends and relatives, to whom he now owes £2,234. He purchased his business premises in 1920 for £500, paying a deposit of £100, and the deeds are held by the bankers as security for an overdraft of £717. The debtor attributes his failure to loss of trade from cotton mills following the cotton slump in 1923, depreciation of properties, machinery and plant, severe competition by soap combines and abnormal rise in the cost of raw materials.

APPOINTMENT WANTED

(1½d. per word; minimum number of words 16.)
Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and sixpence is charged.

CHEMIST, B.Sc., eleven years' experience factory control, analysis and research, seeks change. Write Box 1752, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

AGENCIES

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

WELL KNOWN Firm of Exporters with Head Office in London and branches at Melbourne, Sydney and Brisbane desire to get in touch with Manufacturers in Great Britain and on the Continent of Silicon Tetrachloride, Ethyl Silicate and Silicic Acid. Write Box No. 1754, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

BUSINESS FOR SALE

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

GOOD OPENING FOR QUALIFIED MAN. Small ANALYTICAL CHEMIST'S BUSINESS, established about 5 years, in busy progressive town. No competition. Central premises; good equipment. Price £350. Details WOODCOCK AND SON, Ipswich.

FOR SALE

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

'Phone 98 Staines.

BONECOURT Gas Fired Boiler, 66 in. by 33 in., Werner Jacketed Mixer, 29 in. by 29 in. by 23 in., Gunmetal Werner Mixer, 32 in. by 22 in. by 18 in., Morton 3-speed Bowl Mixer, 20 gallons, 26 in. Tullis Hydro Extractor.
HARRY H. GARDAM AND CO., LTD., STAINES.

COPPER VACUUM MIXING PAN, jacketted, tilting, driving gear on stand, 30 in. by 30 in. deep. THOMPSON AND SON, 60 Hatcham Road, Old Kent Road, S.E.15. New Cross 1147.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3633 East.

COPPER JACKETTED PAN, 6 ft. diam. by 5 ft. deep, 3 in. outlet, mounted on four legs. C. F. DAVIS, LTD., 60 Hatcham Road, Canterbury Road, Old Kent Road, S.E.15.

REVOLVING Steam Jacketed Autoclaves, 1,000 Galls. capacity; not been used; reasonable offer considered. Apply W. WRIGHT, Waverley Chemical Works, Factory Lane, Tottenham, N.17.

"SCOTTS" Vacuum Evaporator, with Pump, etc. Oval Vacuum Oven, 3 ft. by 2 ft. Jacketted Copper Pan, 5 ft. dia. by 30 ins. deep. Earthenware 2-plunger Pump. 60 in. Steam-driven Hydro Extractor. Werner Mixers, all sizes. Impact Grinders. Edge Runner Mills. 3 and 5 Roller Refiners. Disintegrators, etc. DARTNALL, 248a Humberstone Road, Plaistow, London, E.13.

WANTED

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3633 East.